VOL. XXXII.] 1888. [No. 145.

JOURNAL

OF THE

Royal United Service Institution.

WHITEHALL YARD.

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL.

COMMUNICATIONS TO BE SENT TO CAPT. BURGESS,
THE EDITOR.

Authors alone are responsible for the contents of their respective Papers.

LONDON

PUBLISHED BY W. MITCHELL AND CO.,

CRAIG'S COURT, CHARING CROSS,

NEAR THE ADMIRALTY AND HORSE GUARDS.

ENTERED AT STATIONERS' HALL. ALL RIGHTS RESERVED.

HARRISON AND SONS, PRINTERS IN ORDINARY TO HER MAJESTY, ST. MARTIN'S LANE.

PRICE 5s.

SUBSCRIPTION.

An Entrance Fee of One Pound on joining the Institution.

ANNUAL SUBSCRIPTION, ONE POUND.

LIFE SUBSCRIPTION (including Entrance Fee), TEN POUNDS.

ANNUAL SUBSCRIPTIONS are due *on the 1st of January* in each year.

When a Member joins the Institution on or after the 1st of October, having paid his first Annual Subscription, he will not be charged a second Subscription on the following 1st of January, but it will become due on the 1st of January of the second year.

THE JOURNAL.

The Journal is sent post-free to Annual Subscribers of One Pound, and to Life Subscribers of Ten Pounds; should a Member's Subscription fall in arrear, the *issue of the Journal is stopped*, and is only resumed after such Subscription has been paid.

Members wishing to obtain a separate copy of any lecture can do so on application to the Secretary, and on payment of 1s. *per copy, exclusive of postage*

A small number are struck off for this purpose after the publication of each number of the Journal, for the accommodation of Members.

Members on changing their addresses are particularly requested to notify each change to the Secretary, in order that delay in forwarding the Journals and other communications may be avoided as much as possible.

N.B.—For forms of Membership, see page 3 of wrapper.

B. BURGESS, CAPTAIN,
Secretary.

WHITEHALL YARD,
October 1888.

A corrected copy of Plate XI is forwarded with this Number to replace that issued in No. 144 in "Chamberlain's Game of Naval Blockade." The price of the game is now reduced to 7*s.* 6*d.*

Memor

OF THE

Late Admiral of the Fleet,

Committe

ADMIRAL SIR AUGUSTUS PH
ADMIRAL SIR EDWARD S. S
VICE-ADMIRAL GEORGE W.
REAR-ADMIRAL P. H. COLO
CAPT. CYPRIAN A. G. BRID
COL. H. EVERITT, R.M.A.
C. E. BAXTER, ESQ., LATE
REV. J. B. HARBORD, M.A.
REV. C. J. CORFE, M.A.

For information, apply to C. E. BAXTER

24,

orials

THE

et, Sir A. P. Ryder, K.C.B.

mittee :

PHILLIMORE, K.C.B., *Chairman.*
S. SOTHEBY, K.C.B.
W. WATSON.
OLOMB.
RIDGE.
A.
TE R.N.
I.A.

XTER, ESQ., *Hon. Sec.*,
24, Ryder Street, St. James', London, S.W.

The Journal
OF THE
Royal United Service Institution.

VOL. XXXII. 1888. No. 145.

Friday, May 25, 1888.

GENERAL G. ERSKINE, Vice-Chairman of the Council, in the Chair.

THE EQUIPMENT AND TRANSPORT OF MODERN ARMIES.

By Colonel H. M. HOZIER, Lieutenant-Colonel 3rd Kent Artillery Volunteers, &c., &c.

IN venturing to address you upon the subject of the equipment and transport of a modern army, I must in the first place deprecate any idea that I for a moment consider my opinions worthy of plenary adoption, or indeed, in any way matured. I have thought much of this subject, which seems to me most important, and I can only hope that by bringing it under your notice a discussion may arise, which will evolve opinions much more worthy of adoption than my own, and that at least some good may result, and some public opinion be evoked. The problem of how the equipment and transport of modern armies should be organized is no doubt a most difficult one, and only by all who have any experience of the subject combining and exchanging ideas, is it probable that a satisfactory solution will be arrived at.

Before we can actually consider the nature of the transport and equipment of an army, it is necessary to consider what duties armies of the future will probably have to perform, since it is upon the nature of these duties that the organization of their auxiliary departments must mainly depend.

On the Continent, we see on either side of imaginary frontier lines armies ready to be mobilized within a few days, while close to the frontiers there are stationed enormous masses of cavalry ready almost at a moment's notice to cross the frontier and sweep forward over the enemy's territory. These great masses of horsemen will assuredly on the first declaration of future war, or possibly even without a declaration of war, so soon as a Government has determined that war is to be made, dash forward and press on until they are checked either by equal or superior forces of hostile cavalry, by infantry in superior

strength, or by fortresses which command the defiles through which the horsemen must pass. These cavalry will seize roads and railways, will break up lines of communication useful for the enemy's mobilization and concentration, and secure the roads and railways useful for the advance of their own infantry. If both sides are equally prepared cavalry will quickly meet cavalry, and there will probably ensue a great deal of cavalry fighting by troopers both mounted and dismounted. Thus cavalry supported by horse artillery will be of enormous importance at the beginning of a war, and the more rapidly the cavalry can move forward, the larger amount of the area of the theatre of war will be cleared, and the greater advantage will be gained by the Government to which it belongs. Yet vital issues will hardly be decided by horsemen alone. Much will probably depend on which side can most quickly support its advanced horsemen with infantry, and the more difficult the country the more will this probably be the rule. For all heavy transport, for bringing up siege trains, and for the supply of ammunition, railways will be of great importance. On the Continent of Europe there is now a regular network of railways, which is daily being developed and extended. The railways which run from frontiers into the hearts of Continental countries are as a rule broken at certain points, and commanded by fortresses. Armies in advancing can mask fortresses of small size by detaching a corps of investment which the enormous size of modern European armies allow to be separated without much impairing the numerical efficiency of the fighting line. Fortresses, however, of large size such as entrenched camps will often stop an army, as it would be difficult when sides are at all equal in numbers to leave enough men to surround them, and yet to carry on the campaign. In this case it must be of great importance to surround entrenched camps rapidly, before they and the troops enclosed in them can be amply provisioned, as hunger will probably be found the best, if not the only means of reducing them. From this hasty sketch of what possibly may occur at the outbreak of future wars, the general lesson seems to be taught that rapidity of mobilization and celerity of movement must be of enormous advantage. Whether it be the cavalry that dashes first into a hostile country, or the infantry which has to come up to support it, or the heavy columns which must beleaguer fortresses, and guns of position and the siege trains which support them, it is of enormous importance that every movement should be made without delay and with the rapidity which almost should partake of the nature of a surprise.

If we turn from the abstract question of the probable future duties of armies in general, and consider more closely what may be those of that army in which we must be chiefly interested, viz., the British Army, it seems to me that our administrators and our organizers should not be content to follow or plagiarize the administration or the organization which is adopted by Continental armies. It seems to me that as the organization and administration of an army are merely the proper application of prescience and foresight and business capacity, there is no reason why our military organization and equipment should

not excel that of Continental countries as much as our manufactures, our industries, and our commerce excel those of our neighbours on the Continent. The British Army has more varied duties than that of any other countries on account of our great extent of Colonial Empire. We are constantly exposed to military expeditions of various descriptions, and the wars in which a British Army might possibly be engaged appear to me to be capable of classification under four great headings:—

(*a.*) Small wars, such as those in Abyssinia or the Soudan, which can be carried out by a well-equipped body not exceeding 30,000 men in number. It seems to me that hardly less than this number, which is that of a Continental *corps d'armée*, should ever be employed, since to employ a smaller force generally entails detail, and often danger.
(*b.*) Wars in India or the frontier of India.
(*c.*) Defence against the possible invasion of these islands.
(*d.*) Offensive wars on the Continent of Europe.

With regard to the first of these—small wars, such as those of Abyssinia—it is not necessary to consider them in detail, since an army which is equipped and organized efficiently for European war will certainly be able with perfect facility to detach 30,000 men to carry on a campaign in a semi-barbarous country with merely such additions as may be considered necessary for climate. Nor is it needful for us here to discuss Indian wars, as the Army in India is specially organized and specially equipped with transport. In the case of the defence of this country against invasion, an army which is equipped for foreign war will be the most suited for a defence of its home, but it must be remembered that no defensive war can ever be ultimately successful without power of assuming the offensive. An army which remains purely on the defensive must in time have its defensive strength broken down. Hence, if we are to look forward to bringing to a satisfactory conclusion any European war in which we may be involved, we must be prepared to carry our arms into our enemy's country, and to compel him to make peace at the gates of his own capital, or at least to inflict such blows upon a hostile country as may make it willing to consent to peace.

If this be granted, although it is impossible in the short space at our disposal to discuss every possible political combination which may call a British force into the field on the Continent, we may consider as an example what might be done even by an army not very numerically large in a Continental war. It is to be hoped that a British Army engaged on the Continent will always act independently. It is probable that we shall not have to act on the Continent without allies, but if we should have allies it will be advantageous to us that the British operations should be on separate lines from those of our allies. Our peculiar position among Continental Powers makes this more suitable for us, and our enormous strength in the way of mercantile marine gives us a movable base such as is not enjoyed by any other country.

We might land a small force of 40,000, 50,000, or even 100,000 men, and strike an enemy's line of communication. Our command of the sea gives us the power of doing this. We might strike a heavy blow, and although we should be exposed, so soon as the enemy could concentrate, to being attacked with overwhelming numbers, we should draw him off from our ally, and if sufficiently mobilized, our troops might re-embark before the enemy could deliver his blow, and gain power to act against him upon some other point of the theatre of war. To carry out such strategy, the power of very rapid movement must be necessary. We must be able to advance and retreat even more rapidly than the troops of a Continental country.

It seems to me that to secure this great rapidity and mobility we should bear in mind in all our organization certain broad principles. In the first place, we should handicap neither our men nor their horses by giving them a single ounce of unnecessary weight to carry. Secondly, as railways must enormously assist in any rapid advance or retreat, a good railway corps able to repair railways when advancing or destroy them in retreating, with every appliance of rolling stock and bridge equipment, should invariably accompany an army, and be ready to disembark and commence operations the moment the outposts are established. Thirdly, that all camp equipage to accompany the fighting troops should be discarded, and considered as obsolete. It seems to me that if our army is within striking distance of the enemy it would be impossible to pitch camps, and that the troops must bivouac. If, on the other hand, the troops are sufficiently far from the enemy to allow them to pitch camps, they will be able to avail themselves of the villages of the country. Camp equipage in certain countries, such as Spain at the beginning of this century, or Central or Southern Africa at the present time, where there are no villages, is necessary; but in European countries where there are plenty of villages it is a work of supererogation to carry camp equipage which blocks up the roads and prevents the rapid movement of troops.

The troops that can move with the greatest rapidity are cavalry and horse artillery. It is universally acknowledged on the Continent that artillery must be pushed into action in future much more rapidly than hitherto, in order to prepare the battle for the attack of infantry, but neither cavalry nor horse artillery can strike the heavy blows which must be struck unless they are supported by infantry. It seems to me that one of the great problems of the future will be to bring infantry into action with great rapidity. I do not mean marching infantry 12 or 15 miles in the course of the day, but to be able to launch infantry 40, 50, or 60 miles within twenty-four hours. The weaker the Army is numerically, the more important will it be that this rapidity should be developed, in order to turn the enemy's flank, to attack when his corps are not concentrated, or to elude him when he is concentrated and is about to advance in force. The problem of mounted infantry, that is, mounted on horses and ponies, has attracted of late considerable attention, but there seems to be one great disadvantage in infantry mounted in this way. Each horse em-

ployed brings into action less than one fighting man, because for probably every three men who dismount to fight, one must be left to hold the horses. The feeding and supply of these horses will be very difficult in war. I do not think that the question of cost ought to be brought into consideration. It seems to me that a country like England, which depends upon its wealth, ought not to have any scruple in spending any amount of money in maintaining its Army efficiently—the first point is to secure thorough efficiency, after that efficiency is secured to endeavour to combine economy with it.

It seems to me that if infantry instead of being mounted on horses were mounted on double Irish outside cars, each on four wheels, and drawn by four horses, a great advantage would be gained. These would each mount twelve men and a non-commissioned officer; thus four horses would bring thirteen men into action. The cars, too, would carry a certain amount of spare ammunition, kits, and cooking kettles, and thus some transport would be saved. Only in exceedingly mountainous country could these cars not act, and in such countries in all cases infantry would have to fight on foot. It must be remembered that there is now no great extent of country in Europe, even in the Alps, where there are not good roads. The state of the roads of the Continent is very different to what it was during the wars of Napoleon, and there is hardly any country where future war is likely to take place that there are not roads on which such cars could move. It is, of course, for administrators to determine what proportion of infantry should be mounted. For the sake, however, of outflanking the enemy or making rapid marches it appears evident that the more of these that are provided, the better.

If cavalry, horse artillery, field batteries, and infantry are provided in sufficient numbers, certainly a very formidable force could be thrown with rapidity on an enemy's flank or line of communication, or seize important defiles, or surprise unsuspecting fortresses.

In order, however, that these troops should move with all the celerity possible, it is very necessary to reduce, if it can be reduced, the weight at present borne by the men. In reducing this weight I should be the last to advocate that the men should be exposed to needless hardships. On the contrary, it seems to me that it is the most penny-wise and pound-foolish policy to neglect in any way the comfort of the British soldier. There is an essential and vital difference between the British Army and that of any Continental Power, and this difference presses itself on our attention at every point. The armies of the Continent are recruited by conscription, the Army of England by voluntary enlistment. It says much for the military spirit of our nation that without legal compulsion in any form the country is able to maintain in round numbers about 600,000 men exclusive of colonial corps. In many respects a voluntary army is apparently more costly than one raised by conscription, but this difficulty is in truth only seeming. It is impossible to calculate in money value the enormous loss entailed upon a country when young men are universally taken away from civil life from the time that they are twenty till twenty-three years old, and when the whole

population is liable for war service until close upon fifty years of age. This strain upon a country cannot be shown in currency nor in any taxation, but could it be recorded in the figures of the exchequer it would almost certainly be found that taxation on the Continent for the support of troops, even man for man, is more weighty than in this country of free enlistment, and our countrymen should be prepared to pay in cash very liberally for the great advantage which they reap in the comfort of not being liable to compulsory service.

Yet when enlistment is free men must be induced to enlist, and when their pay is small, as it is with us in proportion to the wages given in the open labour market, there must be some other consideration. If our Army were only required for field service and for war no show uniform would be requisite, but for the sake of free enlistment a handsome uniform is necessary. According to my opinion, to dovetail the uniform of peace, which should be smart and handsome, with the actual dress suitable for field service is impossible. I should much prefer that there should be one uniform for time of peace, to be worn on dress parades and by the men when walking about, which should be more handsome than the present uniform, and might last the men for a period possibly of five years. The actual dress for war might be worn on ordinary duties in barracks or camps and replaced every year. It would be very expensive to have different arms for peace or war, therefore the same arms might be used in both peace and war. It is not necessary here to discuss the dress of peace. A slight modification of the present dress of each regiment with some additional gold and ornament would probably constitute a sufficiently handsome dress to meet all requirements. I propose only to deal with equipment as suitable for active service, and shall begin with the matter of dress.

Dress.

A man, to be able to undergo the hard work of a campaign, should be dressed comfortably and stoutly. In my experience there is no dress which is so convenient for all purposes, whether mounted or dismounted, as that which is worn by many English sportsmen for shooting or cub hunting. With a slight modification this dress would be eminently suited for the field. I do not, for various reasons, propose that there should be any difference between the dress of mounted and dismounted men. In the first place, it is much more easy to supply articles of dress and equipment whenever required, provided that all men are dressed the same. In the second place, with all mounted corps there are a certain number of dismounted men, and these increase through horses dying of disease, or being killed more quickly than their riders from being larger objects. It is probable, too, that in future wars cavalry will have to act much more frequently dismounted than hitherto; and on the other hand, infantry may often be mounted as much as possible in order to secure rapid marching.

The dress proposed would be a flannel shirt, the tail of which

should button up both in front and behind, so as to form a thickening over the stomach, and thus add to the protection given by the cholera belt, which should always be worn both day and night.

Dark brown tunic, double-breasted, with pockets, fitting tolerably close but not tight; on the shoulder straps, in brown braid, should be shown the number of the regiment, but not in a conspicuous manner, while on the collar the distinctive ranks might be shown. All who have been in European wars must have noticed with what facility they could perceive exactly what troops were in any particular column, or quartered in any particular town, by the conspicuous marks distinguishing the various regiments in red or yellow on the shoulder straps.

A pair of dark brown breeches, buttoning below the knee with four buttons. Dark brown canvas leggings, fastening with buttons secured by studs, so that the buttons can only be pulled off with difficulty, and when pulled off can be easily replaced from a few spare buttons carried.

Yellow untanned boots, lacing in front, kept waterproof by means of grease, with nails in sole and heel.

If desired, a pair of braces.

The head-dress is always a great difficulty. It is very difficult to find a covering for the head which will be serviceable and not very ugly. The head-dress now proposed consists of a cap made like a deerstalker's cap, with a peak behind to prevent rain falling down the neck, but without a peak in front. In front of the cap is a small ornament in bronze, and a short feather to relieve it from being very plain. When a man has to sleep at night the cap is merely turned round. The peak, formerly behind, shades the eyes, and nothing interferes with his lying flat on his pillow. Nothing is more uncomfortable than to have to sleep or try to sleep in caps with a peak behind. It certainly awakens the wearer and destroys true rest.

The great coat also may be dark brown, with an Inverness cape of slightly waterproofed material. It comes down, both in cavalry and infantry, almost to the ankle. The material will give warmth when the cloak is drawn closely round the body. It will not be very hot when riding or marching because of the spaces underneath the arms which will open when worn loose. The warmth required by men at night, or in cold weather, will be obtained by putting on extra jerseys, which will make the body quite hot. The great coat or cloak can thus be kept very light. If the body and heart are kept really warm, the extremities feel no cold. The great coat proposed weighs under 3 lbs.

It is absurd in present wars to handicap our soldier with a large amount of change of dress to be carried by him. It was very well in the days of the Duke of Marlborough, when troops had to march without transport, or without transport which could keep up with them, from Flanders to the Danube, and every man had to carry everything he required in his knapsack. Such was also the case in the Peninsular War, when troops outmarched their transport, and were away from it for a long time, and when transport was very

difficult to obtain. But in late European wars troops have never been but for a few days cut off from their base of supplies. Such will always be the case in future wars in civilized countries, such as those on the Continent of Europe. It is for these wars that our troops should be held ready. For distant wars, under special and peculiar conditions, such as those in the Soudan or in Abyssinia, there is always plenty of time before war is begun to make special preparations for the men's equipment. European wars tend every day to break out more suddenly and to be carried through more rapidly. It will be very serious for any country which in future does not hold its soldiers ready to take the field at literally an hour's notice, and to maintain themselves there efficiently when suddenly called upon to act.

Troops in Continental wars seldom make above five or six marches without their transport coming up to them, especially as heavy stores are now transported almost entirely by railway from the bases of communication to within a short distance of the fighting men.

It is impossible to expect that troops in future European wars can be accompanied on the line of march by a large number of transport wagons. These are not only inconvenient in every other way, but in following each battalion they employ such a large extent of road that the rear battalions cannot get up in time to support the leading battalion when suddenly engaged with the enemy. If the wagons do not follow each battalion, but are put in rear of corps of some 30,000 men, they cannot get up at all in time to be of use before the troops are bivouacked or cantoned, and have shaken down for the night.

For this reason it appears to me that every man should carry with him what he requires for a certain number of days, but for a few days only. After marching for three, four, or five days, a halt takes place of some duration, when the transport can get up, and the men's supply of dress can be recruited.

A man dressed as suggested above, provided that troop, company, and battery Officers take care that his equipment is thoroughly complete and efficient on starting, can go with very little for several weeks. In fact, he ought to be in perfect condition until the soles of his boots wear out, which probably will be only in four to six weeks' time.

Kit.

The articles which a soldier must have constantly with him are, of course, his—

Arms and ammunition, of which we shall speak further on;
Belts, of which we shall speak further on;
Canteen or mess-tin, which should be of such dimensions as to permit soup to be made in it, for troops will not in future be able to trust to getting up their cooking gear on wagons;
Water-bottle;
Haversack;
Two light jerseys. These are of the greatest use, as by putting them on underneath or over a flannel shirt any warmth can be

obtained, and by taking them off comparative coolness secured and a weighty great coat avoided. All who have been in war must remember how bitterly cold it often is in the early morning, even when the day itself is very hot, and how convenient it is to have light additional articles which can be put on and taken off easily. A couple of light jerseys under or over a shirt give much greater warmth than very thick coats. The layer of air between the jerseys seems to have some peculiar effect of giving warmth, and they are easier and lighter to carry than any outer clothing;

Spare pair of socks;

Pot of grease, in order that the men's feet may be regularly greased and prevented from getting blistered in marching. The same pot of grease will also be of great use in softening belts which get hard, and in greasing the boots to keep them waterproof.

A few nails, to replace any that may be knocked out of the soles of the boots;

A few spare buttons, to replace any on the gaiters which may be torn off;

Small comb, hair and clothes brushes;

Needle, thread, and a few buttons, to repair clothing;

Towel, rag, spare boot laces, and spare buttons for leggings;

Knife, fork, and spoon;

A pocket-knife;

A leather drinking cup, which will also do for scooping up water.

In the case of dismounted men, the water-bottle and haversack can be carried slung over the shoulder, as usual. The canteen can be placed on the top of the valise, and the rest of the articles in a very small valise, to which the great coat can be strapped.

Equipment for Infantry Soldier.

With regard to the equipment for an infantry soldier, I propose that his belts should be, as the belts of the whole army, made of soft brown leather. Valise equipment must be retained, but of somewhat lighter pattern. The rifle should be a magazine rifle. It is useless to expect our men to take the field with any chance of success against Continental troops, without magazine rifles. The military administrators of the Continent are equipping their men as rapidly as possible with such rifles. If we are to hold our own in war we must do the same. As far as my experience goes, it is not necessary to have a magazine rifle which would fire a very large number of rounds without reloading. Great rapidity of fire is required only for a few moments to repel an attack or to carry a post. If the fire be at all well directed, six rounds quickly put in will do all that is requisite.

The pattern of the rifle to be adopted is one which must be left to experts.

The mode of carrying ammunition on the man is much the same as that at present laid down by regulation.

With the matter of spare ammunition I deal later.

From Lord Wolseley's "Soldier's Pocket-book" it appears that the following is the lightest equipment with which an infantry soldier can now take the field:—

Infantry Soldier's Equipment in the Field.

Arms and Accoutrements.	Weight.	Articles worn by the soldier.	Weight.	Valise and articles carried in it.	Weight.
	lbs. oz.		lbs. oz.		lbs. oz.
Pouches	1 11	Chaco	0 15	Great coat	5 14½
Waistbelt and frog	0 14	Tunic	3 2	Shirt	1 1½
Ammunition (70 rounds)	7 5	Shirt	1 1½	Socks	0 4½
		Trousers	1 11	Towel	0 8
Rifle (Martini)	10 4	Braces	0 3¾	Spoon	0 1¾
Bayonet	0 13½	Socks	0 4½	Comb	0 0½
Scabbard	0 4½	Leggings	0 10½	Brush	0 3½
Knife and lanyard	0 5	Boots	3 3	Pot of grease	0 4
Water-bottle (full)	2 10			Housewife	0 3
Mess-tin	1 5½			Sponge	0 6½
Haversack	0 8½			Boots	3 3
				Glengarry cap	0 4
				Account book	0 2
				Valise and straps	3 1
Total	26 1	Total	11 3¼	Total	15 3¾

Recapitulation.	Weight.
	lbs. oz.
Valise and kit	15 3¾
Arms and accoutrements	26 1
Clothes worn	11 3¼
Total carried by the soldier	52 8

This gives a total weight without rations of 52 lbs. 8 oz. I propose to reduce this to 39 lbs., and I still hope that the man will be more comfortable and fitter for marching, thus:—

	lbs. oz.
Valise and kit	6 3¾
Arms and accoutrements	23 7
Clothes worn	8 12¼
Total	38 7

Say 39 lbs.

Cavalry Dress.

The dress proposed for the cavalry soldier is essentially the same as that for the infantry.

Brown tunic, with distinction of regiment on shoulder and rank on collar.

Brown breeches, buttoning below the knee with four buttons.

Brown canvas leggings, with buttons secured by studs.

Untanned brown boots, lacing in front. The only difference from the infantry soldier would be that the boots should have a few nails in the heel and toe only, leaving the sole free from nails where the stirrup iron would come.

Flannel shirt.

Cholera belt.

Brown leather gauntlets.

If desired, pair of braces.

In the case of cavalry, the shoulder straps should have upon them a very thin bronzed chain. This is of wonderful effect in stopping a sword descending on the shoulder, and it might be very desirable to have a similar thin chain down the arm, and on the back of the gauntlet.

With regard to the spur, the ordinary hunting spur is as good as any, and can be worn quite comfortably with lace boots, but for the sake of lightness and convenience a similar spur to the present, which should screw into the heel of the boot in the same manner, would probably be more convenient, except that it would not be so readily taken off at night when men wanted to sleep. The spurs would of course be browned. Cap and cloak as for infantry.

The spare kit for men would be—

Two light jerseys.

Pair of spare socks.

Pot of grease.

Small comb, hair and clothes brushes, towel, rag, spare buttons, nails and bootlaces, needle and thread, knife, fork, and spoon, pocket knife, and leather drinking cup.

A small case of browning material.

The mode in which it is suggested that the kit should be carried must be dealt with after dealing with the horse equipment.

Horse Equipment.

I have no doubt that some of the Officers commanding cavalry regiments will look upon my proposals with regard to horse equipment as extremely revolutionary; but it must be remembered that the horse that has to carry the lightest weight is the horse that will do the most work and stay longest. The first object of cavalry is that the horse should be as little weighted as possible; the second, that vedettes and patrols be concealed as much as can be. Anybody who has been in war must know how often the position or presence of an enemy is discovered by the glint of sunlight on a sword, a lance, a

bridle, or stirrup iron. Men who have hunted must often have remarked how quickly the hounds could be found on a sunny day by seeing the sparkle from a stirrup iron in the distance, and also must have noticed how distinctly the scarlet coat can be seen against covers. It is for this reason as well as for others that I have suggested that scarlet should be discarded for the fighting dress, and brown substituted.

The laws of optics tell us that grey is the colour most difficult to be seen. Such, possibly, is the case when scientific experiments are carried out; but in time of war, when fields are bare and troops have to be moved over fallow ground, very often amongst trees which are nearly always tinted with brown, except for a few weeks in midsummer, brown is the colour least easily seen, and much the least easily dirtied. Nor is this unimportant. If troops find that all goes differently in war to peace—that the cleanliness they have been taught to observe must all go by the board, that the sparkling brightness of curbs and arms must be abandoned, and rust permitted unchecked, discipline is only too likely to go with the cleanliness, and the men to become demoralized.

The following may be taken as the average weight of articles carried by man and horse of a medium or heavy regiment of the British cavalry, and it is probable that in the light cavalry they are not much less.

Articles.	Weight.	
	lbs.	oz.
Valise, packed	18	0
Wallets, „	10	0
Cloak and cape	11	8
Cornsack	1	8
Nosebag	0	8
Horse's head kit	10	0
Saddle, without wallets, with cases and shoes	38	0
Hessian boots and spurs	6	0
Helmet	2	0
Tunic	4	0
Pantaloons	3	8
Haversack	0	8½
Gloves	1	8
Pouch and belts	3	0
Sword and belt	4	8
Carbine	7	8
Head and heel rope and picket peg	4	0
Water-bottle (full)	2	10
Mess-tin	1	5½
Total	130	0

Say, with ammunition and forage, very nearly 10 stone.

By adopting the arms and equipment which I suggest I propose to abolish the valise, carry the spare kit in the wallets, and thus be able to use a saddle which will not weigh more than 12 lbs., or with numnah 20 lbs.

The spare kit is at present carried as follows :—

In near wallet—

1 highlow	1 horse rubber
1 tin of blacking	1 stable sponge
1 curry comb	1 oil can

In the valise—

Near side.	Off side.
1 pair of drawers	1 pair overalls
1 shirt	1 shirt
Plume case and plume (if not worn)	1 pair socks
1 pair socks	2 towels, with soap
1 pair gloves	2 shoe brushes on top of the roll
Clothes brush	
Holdall, complete	
1 flannel vest	
Hair and brass brushes on the top of the roll	

In off wallet—

1 highlow	Horse brush
1 button stick	Pipeclay and sponge
1 tin of brass paste	Stable bag

In the flap—stable jacket and pocket ledger.

I propose that the weight carried should be as follows :—

Articles.	Weight.	
	lbs.	oz.
Wallets, packed	6	0
Cloak	3	0
Two nosebags, one to act as bucket	1	4
Horse's head kit	8	0
Saddle and numnah, with shoe	21	0
Tunic	3	0
Breeches	3	0
Haversack	0	8½
Gloves	1	0
Pouches and belts	5	0
Sword	4	0
Pistol and butt	6	0
Leather drinking cup	0	1
Pocket knife	0	5
Canteen	1	8
Water-bottle (full)	2	10
Total	66	4½

Say 70 lbs. or 5 stone, with ammunition.

The wallets would contain curry-comb, sponge, grease-pot or oil-can, pair of socks, clothes-brush, housewife, two jerseys, hair-brush, comb, towel, horse-brush, soap, browning material, rag, spare buttons, nails and boot laces, knife, fork, and spoon, and leather drinking cup.

Each horse need carry only one spare shoe.

By the abolition of the valise the saddle does not require so high or heavy a cantle as at present.

The weights of the proposed equipment are taken liberally so as not to be too favourable.

To carry more forage than one or at most two feeds of oats on the horse appears unnecessary if the Commissariat Officers with the advanced troops are prepared to pay for supplies with ready money.

The saddle would consist of nothing practically except the saddle-tree with leather seat and stirrups. The saddle-tree unpanelled and unstuffed rests upon the numnah against which the man's leg closes. Stuffing and panels are ruthlessly dispensed with, and much weight thus saved. The girth should be of the pattern known as "Cape" by saddlers. The breastplate should be light, but much of the same pattern as at present. The head collar I propose to be of stout brown double canvas, enclosing a very thin chain, which gives it strength, but at the same time does not destroy lightness, and I propose entirely to discard the present picketing chain, and to substitute for it a double coarse hide with a very thin chain enveloped in it. The bridle should be of substantially the same pattern as at present, but rather lighter.

I propose that all articles of steel, such as stirrups, bits, and curb chains, should be browned. This can be easily done when troops take the field in a few hours by the use of ordinary browning material.

The cavalry soldier should have the same canteen as the infantry soldier, but it may be more convenient that this and his water-bottle should be carried in the wallet rather than over his shoulder.

With regard to picketing equipment, the best mode of picketing a horse in European war with which I am acquainted is merely a long hazel stick with a fork where one of the branches has been cut off. This stick should be about 2 feet long, and driven into the ground with a heavy stone (this need not be carried) nearly to the top, so as to force in the branch to the fork. Such a stick can usually be found in every plantation that is passed and need not be carried, but if the scouts report (and they ought to report every day the nature of the country for 30 miles in front) that there is no wood available, sticks of this kind can be easily carried down the legging as postilions in olden times frequently carried their long whip in their boots.

With regard to arms, I should propose that the sword should be long, straight, and triangular. Nothing is such an error as for a cavalry man to cut, he should merely thrust. The sword should be carried in a wooden scabbard similar to that worn by the Indian native cavalry, and suspended in the same manner by a frog-belt worn underneath the coat, and carried short so as not to trail on the

ground when dismounted. The matter of the firearm is tolerably difficult, since the cavalry soldier requires to use his firearm both mounted and dismounted. For mounted work, probably the most convenient weapon is the pistol, as this can be held comfortably to the head of any recalcitrant mayor or town authority who will not provide supplies, while the man is still mounted and dare not dismount. The pistol is also very useful for bringing in prisoners, or for threatening country people who will not give information. As far as my experience goes, the revolver is one of the most useless articles with which a soldier can encumber himself. If it is fired, its central weight and stiffness of trigger pull it down so much that the bullet goes into the ground below the feet of the man fired at. If it does go off easily, it generally does so when it is in one's own holster; and, in nine cases out of ten when wanted, complications of its machinery prevent its being of use at all. Nor does the revolver throw a heavy enough bullet. As a general rule, pistols must be used at short distances, and it is necessary to bring the enemy down before he can close. For this reason a heavy bullet is necessary. The best pistol for use is a breech-loading double-barrelled pistol, throwing a bullet of twelve or sixteen to the pound. This is excellent for close distance, and if you do not kill your man with two shots at him, he is most likely to kill you before you have a chance of firing a third. The pistol, however, is of little use when dismounted, nor is it steady enough to fire with at any long range. To meet this difficulty, I should propose that the men should be armed also with a butt which should fit on to the butt of the pistol and form a weapon which would act as a carbine. A pistol of this description rifled will throw a bullet with accuracy for a long distance, and will be much more handy and quite as efficient as the ordinary carbine.

I should propose that both should be carried in holsters, on a frog belt, over the left shoulder, so that the man may never be without his firearm.

It would be very rare that the firearms would require to be carried loaded, since the breech-loading pistol can be loaded almost instantaneously.

A magazine pistol will, without ammunition, weigh about the same as a double-barrelled one.

Belts.

The belts should be made of soft brown leather attached together, one over the right shoulder and one over the left. The one over the right holds the frog which supports the sword; the one over the left supports the holsters which carry the pistol and butt. Both are to be worn under the coat, and by being attached together can be taken off bodily.

Ammunition must be carried outside the coat, so as to be easily got at. The coat itself is provided with a belt to draw tight or loose as weather may require, and on this belt (which is quite distinct from the sword belt or pistol belt) the ammunition magazines are placed.

Conveyances.

In future wars rapidity of movement of troops will be more important than it ever has been. It will be necessary that all armies should march with great velocity. Cavalry equipped as above will be able to move with great rapidity. Horse artillery should, as far as the mounted gunners are concerned, have exactly the same equipment as cavalry. The drivers should have practically the same harness as at present, except the saddle, which should be of the same pattern as the cavalry. The driver's kit should be carried on the off horse on a pad of similar construction. The drivers of the field batteries would, of course, be equipped in the same manner as the drivers of horse artillery. As the artillery have always their guns and wagons with them, they have no difficulty in carrying kits, cooking kettles, and entrenching tools, or even tents.

Cavalry will be carried, of course, into action on their own horses; the horse artillery and field batteries in the same manner as at present.

With regard to transport, it seems to me that on broad principles, this should be divided into four essentially different portions—

(1.) The sea transport which should be as efficient and as ready for mobilization, and as much an integral part of the mobilization of a British Army Corps as any other transport.
(2.) Railway transport.
(3.) Road transport for slow purposes which should be horsed by heavy shire horses not required ever to move out of a walk.
(4.) Light transport which should be able to accompany troops moving with great rapidity to be able to move at a trot.

With regard to sea transport, it is not my purpose to say anything here.

Railway transport must also be left much to experts. Heavy road transport would be used for replenishing magazines from the base of operations, in case there were no railways, or in case railways were used as the principal lines of communication in filling the magazines from railway stations. The troops in front must be supplied, however, from these magazines by light transport, and regiments also must be provided with similar light transport.

Infantry mounted on cars would not require regimental transport beyond ammunition and hospital carts to accompany the troops, as some of the ammunition, the light kits, and a certain amount of rations could be carried on the cars. These cars would weigh, unloaded, about 10 cwt., and about 27 cwt. loaded, or to take a liberal estimate say 30 cwt., which can easily be drawn by four horses. Regimental transport would be divided into the first line which immediately accompanied the troops, the second line that which came up at the short halts, and the third line of regimental transport which brought up during long halts supplies, means to replenish equipment, arms, &c., from the base of operations.

The supply of ammunition to the magazines in rear of the troops

would be conducted by railway, and from the termination of the railways by the heavy transport. At the magazine, light small-arm and artillery ammunition columns with horses capable of trotting, would be filled and pushed up to replenish the supplies of the troops. Light provision columns would also be supplied from the commissariat magazine, and with horses capable of trotting, would be pushed up to the troops.

It seems to me that if an army were equipped, and had its transport organized on the broad principles suggested, it might move with great rapidity, and even if not numerically very strong, might still take a most important and effective part in any war into which we may be dragged on the Continent of Europe.

Colonel SLADE (late Rifle Brigade): There are one or two points in the lecture we have just heard that I wish to refer to. One is that I think it is rather theoretical to suppose that you could land a force like 50,000 men with all its transport and guns and impedimenta, strike a blow, as the lecturer has said, and then retire. What are you to strike against? In these days of telegraphs all over the world the whereabouts of the force and where it would disembark would be perfectly well known, and in these days of Continental armies which number hundreds of thousands, whilst our organization is about the same as regards the number of men we could put into the field as it was in the Crimea, or a little more, that is, about two army corps. I consider an attempt to land a force and strike a blow against forces which would outnumber it by twenty to one as more theory than fact, and simply an expression. The lecturer wished to change the colour of our uniform. I believe the English red after it has been exposed a little while to the weather is as good a colour as any other—it becomes a brickdust colour. But colour, as regards visibility, depends on the colour of the background. It is not the colour of an individual man or regiment that is seen, it is glint of the sun on the arms and the dust on movement; and when you come to close quarters the colour does not matter two straws when you are so close as to see one another at 200 or 300 yards. I entirely agree as to the desirability of reducing the weight that an infantry soldier has to carry. I speak as an infantry soldier only, and I have Lord Wolseley's authority with me on this point. He was kind enough to write me a few lines the other day on this very point, and to say that in his opinion in future wars, if two armies came into contact, the victory would almost to a mathematical certainty rest, other things being equal, with that army of which the soldiers did not carry their packs or valises. I cannot agree with the lecturer about reducing weight to the extent which he stated. I may say I have for some years past gone very closely into this question of the infantry soldier's equipment, and I do not believe it possible to reduce the weight to the extent stated by the lecturer, especially in the question of ammunition. Colonel Hozier stated that he would reduce the weight of ammunition to a great extent. In the statistics of some of the last European wars, as far as my recollection serves me, we are told that at the battle of St. Privat the French fired away 90 rounds per man, and the wagons not being up they had to retire. The first Prussian Army, at Gravelotte, fired on an average only 12 rounds per man, but several battalions fired as many as 30 and several companies as many as 80 rounds per man. The disaster at Isanduhlana was, I think, entirely due to the failure of ammunition—the unfortunate men had no ammunition in their pouches, having expended it. I do not therefore think it possible to reduce the weight to the extent mentioned by the lecturer. He said he would give the infantry soldier a coat and a pair of socks, two very excellent things no doubt, but what are the necessaries that an infantry soldier must carry in addition? My belief is he must carry a pair of socks, a towel, a housewife, a box of dubbing, knife and spoon, a hold-all, a pair of canvas shoes, a card of identification, a field dressing and probably a pocket filter, a piece of soap and a brush. Nearly all these things must be carried, they are absolutely necessary. There are one or two other things such

as an extra shirt possibly, which would be advisable. If the army is to go without tents entirely in every country, as the lecturer said, I think the weight of the clothes would have to be very much increased, because I do not recollect his saying anything about a blanket. If you are to bivouac every night in different climates you may depend upon it the coat will have to be heavier and the soldier will have to carry a blanket. I think you may reduce the weight of equipment including rations to 39 lbs. a man without his clothes, including ammunition, but I do not think you can go to less than that. I have gone very closely into this subject and could give you the weights of every single article the soldier carries, but I will not take up your time. The lowest possible amount on service may be put down at 39 lbs., including the blanket. There is one other point, the cars. That proposition has been brought forward before. I think any commander, whether of a battalion or brigade, would be very much hampered if he found his infantry mounted on cars, because it is quite true a four-wheeled car or a two-wheeled car would go where horse artillery would go, but in every country in the world there are a great many different descriptions of ground which infantry get over, through woods, down ravines and morasses, where horse artillery and cavalry could not attempt to follow, therefore we should have the enormous expense of feeding these horses and having men to look after them, and after all the cars would probably break down and would not be worth the trouble. I think it would pay your infantry better to march, and that is one of those points which I am sorry to say has been rather neglected of late years. Some Officers may have read an account of a march which four Officers took to Portsmouth last month. They marched 35 miles the first day, carrying the complete kit of a private soldier and 60 rounds of ball cartridge. The next day they went 21 miles, and the third 20 miles, making 79 or 80 miles, without being footsore. I do not think there are many regiments in England which do a march of that sort without leaving a few members on the road. It is much better to train our men to march in service order with ball cartridge and necessaries, than to put them on cars.

General DUNNE: Colonel Slade, who is so complete a specialist on the subject of weights and everything connected with the equipment of an infantry soldier, having already made almost similar remarks to those I was about to make, I can only bear out one or two points of his observations, particularly with regard to something or other for a man to put on his feet after a long day's march. I think he must have that as a *sine quâ non*. No boots ever given to a soldier will do for him to go about in after a long march without some change, so he must have a slipper. I do not think Colonel Hozier mentioned anything about the blankets which a man must have. Even in the hottest climate there is always a dew at night; he must have a blanket to sleep on, and I think he must have nearly everything that Colonel Slade mentioned. I have not had the privilege of taking part in any wars except that in which our Chairman and myself were engaged. I know that from the 14th September, 1854, when we landed in the Crimea, up to nearly the 14th of November, we never had any canvas, except on two or three occasions when a few tents were landed for temporary purposes. About October we began to get some tents, but all the rest of the time we marched almost in a similar way to that which Colonel Hozier speaks of. The French had the plan of the *tente d'abri* for the men in the open, but it must depend a great deal on the climate as to whether it is as good a one as it was on our first landing in the Crimea. In a bad climate we must have some cover for the men to protect them from the wet and snow. There is one other thing in which I disagree with Colonel Hozier. He said he would always let every man carry his own little canteen. Now when you get bad food, the only way in which you can make it tolerably eatable or drinkable, or "swallowable" in any way, is to make a mess of four or five together, and of all the miseries our troops went through in the Crimea, the vile cooking in small canteens was about the worst. I have seen in China a round tin about the size of the top of one's hat, which could easily be carried, one to every five or six men. I saw them do it the other day in the French Army. In that tin they can put their biscuit and anything they can pick up one way or another during their march, and make a soup or something of it. I defy any man to make an eatable dish out of the small canteen that every Officer knows the man carries behind him in his knap-

sack. With regard to the cars, the Wiltshire Yeomanry in 1872 had something of a similar sort in the way of a two-wheeled jaunting car. Certainly they went along in a capital way, but of course there is the objection that there might be ground where they could not go. Colonel Hozier says that in order to push your mounted infantry forward rapidly, you want to have as many horses as men. I venture, however, to say that for a short distance there is no reason why a good horse should not carry a second man up behind, and I think that with mounted infantry a horse might carry a couple of men for a short distance at a push, and mounted infantry are only meant to be used to push forward to gain a position.

Colonel REEVES: I should like to say a word with regard to what the lecturer has said about the two classes of transport, heavy and light. I would go the whole way, and have no heavy transport at all. I think in these days of railways we really do not want the heavy transport, by which I mean heavy transport wagons, horsed by such horses as heavy shire horses. Our heavy transport, I think, would in a Continental war be done by railways, and the transport you would chiefly want would be between the railway and the troops or transport to accompany troops in the field, which must be light. With regard to the wagons, we have a much lighter wagon than we had before. Touching the cooking arrangements, which rather interests me as a Commissariat Officer, I think it is quite possible for a soldier to cook in his mess-tin. I have seen it done myself often, but as to its being done for any length of time, I do think there would be very great waste, and the men would not enjoy half the comforts of having their meals properly cooked as if done under the present regimental system in camp kettles. At the same time I believe in cooking classes; men are taught to cook meals in their mess-tins. At all events it can be done. With regard to weights to be carried by mounted troops, that comes a little bit within my province, having to do with mounted men. I understand the valise has been done away with altogether in the Service, that is to say it is not an article which would be taken to the field by a mounted soldier. His kit is distributed in wallets in various ways, and I think the kit is very much reduced already below the figures fixed in those tables referred to by Colonel Hozier.

Colonel R. S. LIDDELL (late 10th Hussars): As regards what Colonel Hozier has said affecting the branch of the Service to which I belong, I should like to make a few remarks. Of course I will not mention all those things in which I agree with the lecturer, and I agree with nearly everything he has said, and as regards the mounted branch, at all events, he has made many very valuable suggestions. I will confine myself, therefore, entirely to those things in which I do not quite agree with him. In the first place, I might say a word on the subject of mounted infantry, which Colonel Hozier has alluded to. I am one of the rapidly increasing number of cavalry Officers who think that the mounted infantry when kept to its legitimate use is a most invaluable force. The power of conveying infantry rapidly to the front is of the greatest assistance to any cavalry commander, for by this means the drawback formerly experienced of finding himself with his cavalry in front, perhaps, of a mixed force of the enemy, without infantry, will be obviated. I also agree with him to a very great extent with reference to the mode of conveyance, namely, that they should be carried on Irish cars. I remember during the Fenian outbreak in Ireland, a great many years ago, it was very severe winter weather, the ground covered with snow. My regiment, under Colonel Valentine Baker, was sent down by train to Tipperary, and the 2nd Queen's Regiment, a splendid regiment, was with it; the great object of Colonel Baker, under the orders of Lord Strathnairn, being to cover the whole of Tipperary, and to show troops everywhere. The infantry was put on cars on that occasion, the ordinary country cars, and they kept up with the cavalry throughout. I think that where roads are available, cars will, in most cases, answer the purpose, while in some countries camels and in others mules will be available, anything that will convey them to the front. If you have mounted infantry, they are apt to think they can go out, and cover the army, and do scouting work. Now I do not think that is the duty of mounted infantry. What you want is picked shots who can be brought up to the front when there is occasion for them, and if that could be done on cars such a proceeding would be invaluable. Colonel Hozier made some remarks about reducing the

weight of the saddle, which were of great importance. A great deal is being done in this way. We carry sheepskins in peace-time but no valises, and in war these too could be laid aside. Every cavalry soldier is not necessarily a finished horseman, and for such, I think, the cantle is a very great support. If a man is attacked by another, and has to throw himself backwards in defence, or is wounded, the cantle acts as a support to keep him in his saddle. The cantle also has another object. You must carry something, you must have a blanket as Colonel Slade says. You want to keep it off your horse's back, and by tightening it up in the centre the cantle serves that purpose. The saddle which Colonel Hozier recommends was once sent to my regiment; I rode in it, and it was most wonderfully comfortable; you can get close to the horse, and feel that you have hold of him. However, before giving an opinion on it, I should like it to be thoroughly tested. The number of things that must be carried require a rather strong saddle, and I should, therefore, like to see this Mexican saddle tried, to see whether it will carry those things, before giving an opinion upon it. Colonel Hozier wants to substitute a pistol for the carbine. I really cannot quite agree with him there. Cavalry now-a-days employed on raids, or elsewhere, may find themselves in a position in which they have to act independently, to hold it with dismounted fire, and in such cases what is the use of pistols? I think the cavalry soldier should have a carbine, and then if you want a carbine you also want a strong saddle to carry it.

Colonel Hon. R. TALBOT, C.B. (1st Life Guards): I had not intended to say anything to-day, and I was in hopes that Colonel Slade when he began would have saved me from having to speak at all. I refer to that very important point, a point which, I think, is very much misunderstood and underrated generally, that is, as to the colour of the clothes that the troops are to wear. Colonel Slade thinks that red is not a bad colour for campaigning purposes. I agree with him, because I think, in the first place, a great deal too much importance is attached to concealment, and red, while not very conspicuous after a few days' rough wear, is distinguishable. How often is it possible to conceal the movements of troops unless the ground admits of it? In which case, of course, colour does not signify. A body of men in motion is in itself conspicuous, irrespective of colour; there is the dust raised, and the glint of arms and accoutrements show the presence of troops even when attired in the most invisible uniform. But my point is that if troops are in sight it is important to know at once to which side they belong. In these days, with guns and rifles that are effective at enormous ranges, necessitating wide turning movements, there is great danger of mistakes and of fire being directed upon one's own men, and, therefore, it is most desirable that it should be easy to distinguish friends from foes. And my opinion is that the occasional advantage gained in outpost work, and on other occasions where small bodies of troops are engaged, is more than counterbalanced in the larger operations of war, by the disastrous results that ensue when troops are fired upon by their own side. We have all of us seen this happen at field-days and manœuvres, and I have been told by German Officers that it frequently occurred in the Franco-German War. I speak rather feelingly on this subject, because I once nearly met with a great disaster. I was in command of a convoy of sick and wounded crossing the desert between Metemneh and Abu Klea when we were attacked by the Arabs in very considerable force, but owing to the bush it was impossible to see what the numbers were; ours consisted of about 400 fighting men. The attack was made on all sides, and continued for two or three hours. I was acquainted with Sir Redvers Buller's plans and instructions, and knew that no British troops ought to be in the vicinity, but in one of the places where a few minutes previously the Arabs had been seen, a fresh force appeared moving through the mimosa bushes, which turned out to be the Light Camel Regiment. They were fired upon, but fortunately a sharp-eyed young Officer caught sight of a red camel saddle, and the firing ceased at once. If it had not been for that bit of red, very disastrous results might have occurred. I think red for the purpose of distinction is the best colour, because we are the only nation in the world that wears it, and it is, therefore, most distinctive, and I should be sorry to see it discarded on service on the chance that on certain occasions a darker or less visible colour might be useful. I say nothing about the moral effect,

but I cannot help feeling that it would be very great. With regard to the cavalry saddle, of which Colonel Hozier spoke, all cavalry Officers are agreed as to the great desirability of diminishing the weight that a horse has to carry, but it must be borne in mind that arms have to be carried, and rations for man and horse, upon occasions, and that, therefore, a larger and stronger saddle than that used for ordinary saddles is absolutely necessary. The most important consideration on service is the health of the troops, and, therefore, in trying to lessen what men and horses have to carry, we must be careful not to deprive the soldier of what is necessary to preserve him in health. For instance, I think that in cold or wet climates it would be most prejudicial that men should be without blankets or waterproof sheets for long together. Colonel Liddell's remarks generally were most practical and useful, and, I think, the more these matters are discussed, the more chance we have of arriving at what is practical and serviceable in the various subjects brought before the meeting by the lecturer.

Colonel Sir OWEN BURNE, K.C.S.I.: I think we ought to be very much obliged to Colonel Hozier for the new and valuable ideas which he has given us in this lecture. I can bear out the testimony of Colonel Liddell, who has just reminded us that in Ireland the late Field Marshal Lord Strathnairn, on whose staff I then was, made great use of cars for the flying columns during the Fenian disturbances of 1865–66, and they were extremely serviceable. And again, although, perhaps, some of you may smile when I compare elephants with cars, I may state that in the Indian Mutiny we used to put our men upon the elephants, and in that way we often went long distances by night, and overtook the enemy. I think that there is great value, therefore, in what Colonel Hozier has said on this point. I was also glad to hear what he said with regard to the cavalry sword, because I myself have seen some most distinguished cavalry regiments ride boldly through the enemy and back again without "touching a man" with their sword cuts, while we all know the value of a thrust from a good sword or lance against, at any rate, an Eastern foe. In regard to dress, I may mention that some years ago I invented a Norfolk jacket and great coat, very much of the kind Colonel Hozier has now pointed out. I should like to ask Colonel Hozier whether our men could not carry their ammunition equally round their waists, like a sportsman on the moors, rather than have it in pouches? They would carry more ammunition in this way with very little trouble. I designed the great coat just alluded to, so that a man could pack his soap, brushes, extra shirt, &c., here and there all over it. This equalized weight, and enabled the soldier to carry his necessaries easily, and when he took off the coat to have his things ready at hand. The weight was not great—much less than a knapsack, or what the soldier now has to carry. Much has been said by Colonel Hozier and others as to railways. For my own part, having had to consider this question very often in connection with military questions in India, I must say that I fail to see how we can rely on them in a campaign; so long as you are operating chiefly in your own country—as, for instance, the Germans and the French did in the campaign of 1870—railways are, no doubt, most useful, but they cannot, obviously, be solely relied upon in an enemy's country. I certainly hope that military Officers will not advocate the giving up of either heavy or light transport to trust to such uncertain factors as railways in military operations. I think Sir Robert Hume will bear me out, that in the Indian Mutiny we had a great deal of hard fighting and quick marching, and got along the ground in very much the same way as Colonel Hozier has advised us to do. Of course we had the climate in our favour, but we marched without tents, carried with us everything necessary, moved long distances on carts and elephants, and, in one way and another, beat the enemy and saved the country.

Lieutenant-General Sir R. HUME, K.C.B.: With regard to the transport for infantry, that is for the men, of course, the natural transport for an infantryman, pure and simple, is his legs, and I think that they should be made use of as far as possible, and that all extraneous transport, either horses or cars or elephants or whatever it may be, should only be made use of on certain exceptional occasions. The natural way for infantry to get about is by marching, there is no doubt about that, and I do not suppose that Colonel Hozier in advocating cars for transport of infantry would wish to suggest that a number of cars should always be attached to an infantry force for the purpose of transporting them about. But on occasions

and when you can get them, you cannot possibly have any better vehicle for carrying troops than the elongated Irish jaunting car, or something made on the same principle, as light as possible. I should deprecate the idea myself of having any fixed transport for infantry. Mounted infantry are an admirable force—nothing could be better, but at the same time, if you take too many of your men and mount them you lose your actual *boná fide* infantryman, and you suddenly find yourself without a sufficient number of real infantry to do what is *boná fide* infantry work. One of the great objects of infantry, of course, is to finish up a fight by the shock of large bodies of men; and if you use up numbers of your men, mounted either on horses or in any other way, and send them off for detached work away from the main body, then the efficiency of the main body itself has to be thought of. With reference to the amount that a man or a horse carries, there cannot be the slightest doubt that the less either of them carries, the more efficient he will be; at the same time, if a man is going on any movement that is likely to last two or three days—such as in the Crimea, where we landed, and did not know how long the operation would be, a man must have, certainly, a second pair of socks, he should have a pair of slippers, he must have a second shirt, he must have his great coat, and some minor articles. With regard to a blanket, if a man has a great coat (I am speaking from the personal experience that we who landed in the Crimea had as Officers, because every Officer or man who landed there only had what he carried himself), I say with regard to the blanket I would much prefer, for myself and for my men, a light waterproof sheet in addition to the great coat. A great deal of cold and damp comes more from the ground than from above. The light waterproof sheet is very much used in India in all campaigns there: they are always served out and are most beneficial, because they keep you from the cold and damp of the ground, and you can cover yourself pretty well with your great coat. I should certainly prefer the light waterproof sheet to the heavy blanket. I know I and a great many more of us carried a blanket and a great coat and all our kit and three days' rations up the Alma, but I also know after I got there I left the blanket behind, and many of the men left their camp kettles and got rid of them as soon as they could—but they got on fairly well with their canteens afterwards. Certainly the larger the canteen is, the better. With regard to carrying carbines there is an excellent equipment at present in use in India (I do not know whether any Officers here have tried it or have seen it used) called the *Mackenzie Equipment*,[1] by which the carbine is carried slung across the back of the man. I have seen it used with cavalry regiments going over all the regulation jumps, skirmishing in rough country, and skirmishing on foot. I do not know whether it has been introduced into England, but it is extremely good and serviceable. I think with regard to our troops, that although they should start themselves carrying as little as possible, every comfort in the way of clothing and everything else necessary should be kept as near them as possible so that their small kits might be quickly replenished as occasion offered.

Captain G. Todd (Artillery Volunteers): I concluded from the tone first taken by Colonel Hozier in his paper, that we were going to discuss the question of to-day, more particularly with regard to the equipment of the army, specially for the defence of this country. We have been told in this room very frequently, that we are to have two army corps ready to move. I presume from the statement of the lecturer, those two army corps would reckon upon reaching some foreign shore to assist our allies by making a feint in the rear and then getting back again. Now I want to speak more upon the dress and equipment of our home volunteers, defence army. We have been told that we want to know the best kind of uniform for a man to wear. Well, a man at work has working clothes. By all means have the brown suit you speak of. I can answer for the brown kharki Norfolk jacket and breeches, lashed with leather, for I have worn it all my life in summer time, and cords in winter, with brown leather field boots, are the best any horseman can use. I think nothing of going five or more days in that kind of costume. With regard to the uniform, I do not think you can have a better uniform for working uniform, but by all means let us have as much smartness as you can in the soldier's uniform when he is to be seen at reviews, or when not on active service. The more smartly you

[1] The invention of Colonel A. R. D. Mackenzie, 3rd Bengal Cavalry.

dress a man, the more smartly he will move, and be proud of his profession as a soldier, and the great improvement in the gait of our young men, since the volunteer force has been established, is simply marvellous, owing to their drill and uniform. It has improved their physique; it has also brought the regular soldier more into prominence, and has taught the people to respect him, and to feel with the Duke of Cambridge, that it is a shame that long service men should be without bread for their mouths, and have to beg or sweep the streets; they should have civil appointments open to them. With regard to the cavalry saddle, and the riding of the cavalry soldier, I perfectly disagree that the cavalry soldier is a bad horseman. The military schools are the best schools for teaching men to ride that you can find anywhere, and if you take any household cavalry regiment, or any cavalry or artillery regiment in this country, you will find in them, I believe, the best horsemen in the world; they do not obtain assistance from the cantle of the saddle. The question of mounted infantry has been brought up again; the reason of our having mounted infantry is the parsimony of the country in not keeping its cavalry up to its proper numbers or standard. If our armies were formed the same as abroad, with a proper proportion of Royal Horse Artillery, of field artillery, and of cavalry, you would not have to use this funny system of mounted infantry. Now you talk about taking mounted infantry on Irish cars to take them to the front of the battle. There is surely quite impedimenta enough on roads in time of war, without a lot of jaunting cars running about with men. If you have infantrymen let them be infantrymen, and let them be carried about in omnibuses if you will, but let us have sufficient cavalry for the eyes of our army, and then you will no longer require to discuss what is the best way of taking your infantry about. My opinion is, the best way is to teach them to walk and run on the roads. Englishmen ought to be the men who know most about travelling, looking at the number of young fellows who travel through this country with knapsacks on their backs, and on bicycles, &c., they will know what really is best to carry on the march to the front, and they have carried out in great measure Colonel Hozier's views of dress, and that is brown leather for boots, and brown or other coloured kharki for summer, and cords for winter.

Colonel HOZIER: I only wish to say one word. Colonel Slade and Colonel Talbot have both pointed out the practical disadvantage of the glint of the arms. In my endeavour to be as brief as possible, I omitted to state that one of my proposals was that all steel work should be browned, spurs and scabbards, and everything else. I myself should much prefer to see the red dress retained for field work, only there seems such a very strong idea that we ought to have grey, and I should rather instead of grey have brown. Colonel Liddell spoke about the pistol, but my proposal, which I ought to have made clear, is that this pistol should have a butt which can be fixed to it, and so used as a carbine for dismounted purposes. As to the ammunition being carried round the body, I have heard it objected to carrying ammunition round the waist, that it is likely to rupture a man, and that the sword-belt itself, unless supported over the shoulder, is liable to do so. It is, therefore, said, that the best way to carry ammunition is over the shoulder, in the same way that it is carried by the peasantry in Albania. With regard to railways, of course, it was found by experience by the Germans in the late wars, that it is perfectly impossible to trust to railways to move troops or stores of any sort, so long as these are not in the possession of the persons to whom the troops or stores belong. It would be madness, to put troops on to railways, and send them forward into an enemy's country, unless the whole line of railway was secured by proper pickets and patrols. Colonel Slade spoke about it being impossible for us to send two *corps d'armée* to attack large Continental forces, and nobody can be more conscious of that impossibility than myself, but when a Continental enemy may be engaged with one of our allies, we might give very effective help. My idea is, that if we are to defend this country, we must be prepared to strike offensive blows. Defensive action alone will never terminate a war satisfactorily. If we are to wage offensive war, our best way to carry it on is when our allies are engaged with the common enemy, to attack the common enemy wherever we can, either on his line of communication or at his base of operations.

The CHAIRMAN (General Erskine): Gentlemen, before we close the meeting, it is necessary that I as Chairman should say a few words with regard to what we have

done. We have heard a very interesting lecture from Colonel Hozier. The subject which he has taken in hand is one with which we are all pretty well familiar. A great deal from time to time has been written, and a great deal spoken on the equipment and transport of the Army, but I am confident that you will not on that account consider that he has done wrong in taking up the subject, and bringing it to our notice as he has done at the present time. For my own part I welcome any discussion of this question, for I have a lively recollection of what I endured during the early part of my long service through the discomfort and suffering which were occasioned by my having to wear grotesque articles of costume, which I think we may be thankful to have got rid of. As an instance of what I am saying, I recollect that when I joined the Army the infantry wore a shako that had a very wide concave crown, something like a soup plate, and the consequence was that when a shower of rain fell this crown got full of water, and at every movement of the head some of it came trickling down the side of the shako and went down the neck of the wearer, the very last place that one would like to have it. However, this is not a discussion on military antiquities, and therefore I pass on to another point. I observed Colonel Hozier in commencing his lecture stated that there were fully 90 Officers out of every 100 that were much better qualified than he was to take the question in hand. Now, I demur to that view of the question, because I know that he has had very great experience. He commenced his career in the Royal Artillery. He then went into the cavalry. He was afterwards a member of what was called at the time the "Control Department," and in addition to that he took a prominent place both in getting in and getting out of the Staff College. I should not forget to add that during two very important wars on the Continent he was a representative of the press, and in that capacity had an opportunity of seeing war on a scale which most of us have not had the advantage of seeing. It is not my intention (and I am sure you would not wish me to do it) to enter into the details of what Colonel Hozier has said about equipment and transport. I will confine what I have to say to two or three prominent features of what he advocates. One is that there should be two distinct dresses for the Army, a peace dress and a war dress. The peace dress I think he advocates for the purpose of attracting men into the Service; it may be called perhaps a decoy dress—well, I consider that there is a great deal of force in what he advocates. I do not think it possible to dovetail the two dresses into one: that is to say, if you have a very attractive dress to be worn by the soldier in time of peace, I do not think it is possible to transform that into a dress that is altogether suitable for service in the field, and therefore I go with what Colonel Hozier advocates in that respect, but I am not sure that I agree with him in regard to the colour of the field dress. I rather incline to what Colonel Slade said, namely, that the red is not a bad colour at all for service in the field. Then there is another prominent feature of Colonel Hozier's recommendation, and that is, that there should be the same dress for all arms of the Service. There, I think, he is on the right tack. Perhaps when he came to carry his theory into practice, he would find there was some difficulty; but difficulties you know may generally be overcome, and I do not think there would be an impossibility in carrying out his views in this respect. The use of cars for the conveyance of troops is another point which has attracted a good deal of attention on the part of those who have spoken to-day. The use of cars for this purpose is not altogether a new idea, for infantry in different wars have been frequently carried from point to point on vehicles of some description or another. For my own part I rather doubt the advisability of having a special vehicle appropriated to that purpose. I would rather in case of emergency make use of the usual transport wagons of the Army in case they could be spared. I do not think that these Irish cars which Colonel Hozier proposes could be used altogether as a substitute for mounting infantry on horseback, for the simple reason that a man on horseback, if he can ride at all, can go in many places where nobody would think of making a wagon travel. I do not know that there is anything else that I need speak about. Several gentlemen have taken part in the discussion, and I am sure we are all very much obliged to them for giving us the benefit of their opinions, and I think the discussion which has been raised is of value. Finally, I am sure you will all agree with me that we have reason to thank Colonel Hozier for the trouble he has taken in preparing his paper.

Wednesday, June 6, 1888.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B., &c., &c., &c., in the Chair.

THE PHYSIQUE OF THE SOLDIER AND HIS PHYSICAL TRAINING.

By Colonel G. M. ONSLOW, Inspector of Gymnasia, Aldershot.

I CANNOT but feel flattered at having been asked by the Council of the Royal United Service Institution to read this paper here to-day, it being the same that I had the honour to read before the Military Society at Aldershot in March last, and I am gratified to find that the subject of it enlists so much interest, for it is I believe one of *first* importance.

I wish I could feel more confident of my ability to do it full justice, but I can, however, only do my best to place it before you in as interesting and practical a manner as possible, and I must ask your kind indulgence for all shortcomings; and I must also express my gratitude for this further opportunity of attracting attention to the object I have in view, viz., the physical improvement of the soldier, and to invite criticism of the method by which it can, in my opinion, best be arrived at.

You will observe that in the *résumé* of my paper I have grouped the subjects under two heads. The first, the "Physique of the Soldier," is to my mind the more difficult to deal with, and would undoubtedly be better handled by one of the medical profession, on account of the physiological considerations upon which nearly all arguments concerning it should be based. It is also necessary in order to enable one to arrive at any sound and reliable conclusion concerning it, to be able to compare the physique of the soldier of the present with the soldier of former periods, and also with that of other countries; but, in the first instance, one is met with this difficulty, that until within the last few years no records of measurements, weights, &c., were kept, if these were ever even taken, which I doubt, and consequently there are but few data to go upon for purposes of comparison.

One gallant Officer, when talking the subject over with me, said, "You know it would be very interesting if you could compare Tommy Atkins with the soldiers of the army sent by Pharaoh in pursuit of the Israelites in their flight from Egypt," and doubtless it would, but this I regret to say I have not succeeded in doing, and indeed I find that it is only within the last twenty years or so that any reliable statistics

have been collected, during which period the physique of neither the nation nor the Army can have appreciably altered.

There is an impression on the minds of many people that the English race is degenerating, and that the soldier of to-day is not what he was fifty years ago, and that at any rate the British infantryman is not physically the equal of the man who fought under Wellington; but this I believe to be erroneous, though we are unable by figures to arrive at any conclusion on this point; but there is one fact worth mentioning, and it is that the average age of the soldier in the Army in 1803 was 27 years, and the standard height was 5 feet 5 inches for the infantry, and no chest limit; whereas, although the average age of the men now serving is certainly not more than 25 years, and the minimum standard height 5 feet 4 inches, there is a chest limit of 33 inches, and the large proportion of 769 per 1,000 of the men serving are 35 inches chest measurement and upwards, and 920 per 1,000, 34 inches and upwards; and the Inspector-General for Recruiting in his report for 1887 says, "There is probably no army in Europe in which the physical qualities of the recruit are more carefully criticized, both by medical and military authorities, than in this country. In other armies the main care of the inspecting Officer is exercised lest any recruit who might render service should be too easily rejected. In the British Army every Officer who successively inspects a recruit endeavours to find some point with which he can find fault." It is not, I think, unreasonable to assume therefore, that with all these safeguards the "physique" of the soldier is probably now superior, at any rate equal, to that of eighty years ago.

The minimum height and chest measurement of our infantry recruit compare very favourably with that of Continental armies.

In France the minimum age is 20 years, height 5 feet $0\frac{1}{2}$ inches, chest measurement 30·867 inches.

In Austria, age 20, height 5 feet $1\frac{1}{2}$ inches, chest 30·06 inches.

Germany, age 20, height 5 feet 1 inch, chest (no limit, but is considered).

Russia, age 21, height 5 feet $0\frac{1}{4}$ inch, chest no limit.

The English infantry recruit is taken at 18 years of age, height 5 feet 4 inches, chest 33 inches. Eligible recruits under 20 years of age between 5 feet 3 inches and 5 feet 4 inches, and in other respects up to the above standards, may, if considered by the medical Officer as likely to develop into efficient soldiers, be specially enlisted for the infantry of the line. By this, therefore, it will be seen, that though our age limit is lower, our minimum standard generally is higher than in foreign armies. The following figures taken from the general annual Return of the British Army for 1886 are of some interest, and confirm me in my opinion that the physique of the British soldier is still good:—

Of men serving with the colours in 1886, 901 per 1,000 were 5 feet 5 inches and upwards, 931 per 1,000 were 34 inches and upwards chest measurement, and 834 per 1,000 over 20 years of age. In the same year the number of men recruited was 39,409. Of these, 28,286

measured over 5 feet 5 inches in height, 25,617 were 34 inches and upwards chest measurement, and of these 12,028 were 35 inches and upwards, and 14,288 were over 20 years of age.

Now the average height of British lads of 18 years is from 5 feet 5 inches to 5 feet 8 inches, depending upon whether the average is taken among the best favoured, viz., non-labouring communities, or among the artizan classes, so that as regards height there is nothing to complain of, and the fact that about two-thirds of them measured round the chest 34 inches and upwards cannot be deemed unsatisfactory, especially bearing in mind that nearly two-thirds of the whole number were under 20 years of age.

Then another fact that must not be lost sight of in considering this question of physique is that there are a number of lads (and a considerable number) who say that they are 18 years old, when in reality they are but 17, and in some cases only perhaps 16; therefore if these lads of under 18 fulfil the physical conditions required of those of 18 years and upwards, it is a strong argument in favour of my contention, that it is not so much the physique as the youth of the men we are now getting that we have to grumble about if we have to grumble at all. I may here also mention that from reliable data it has been ascertained that a range of growth of from 1 to 2 inches may be expected from 19 to 25 years of age; and the experience of Doctors Balfour and Lawson, well-known Officers, late of the Army Medical Department, as embodied in reports issued by them from 1860 to 1864, shows that a recruit of 18 years of age may be expected to grow 1 inch, increase 1½ inches in the chest, and about 10 lbs. in weight, before he reaches the age of 23. Other observers have arrived at like conclusions. These data were fixed when physical training was almost unknown in the English Army, and certainly had done little or nothing towards improving the soldier's physique.

Both from what I have gathered in conversation with men well capable of judging, and from my own personal observations, I am convinced that at the present time the physique of the soldier is as good, if not better, than in the past. Look at what our men did in 1880 in the march under Roberts from Cabul to Candahar, in a foreign climate, and in hot weather, 232 miles in fourteen days, an average of 16½ miles per diem: does that look like deterioration of physique? But this march was not performed by immature lads, but by seasoned men; therefore I say our material is good enough, if only we give it time to mature, and train it properly while maturing. There is, however, one element of danger threatening which it is incumbent on us to guard against, and it is this—The tendency of the population of the country is to gravitate towards certain centres, to seek employment in large towns, and this must, I fear, have in time a very deteriorating effect on the physique of the nation. There are in England now two town-bred children to one country-bred child, and the proportion must steadily increase year by year.

The Director-General of the Army Medical Department (Sir Thomas Crawford), in a paper which he read to the British Association, stated "that he believed the recruits taken from large towns showed inferior

physique to those coming from rural districts;" and it is a fact that the number of rejections has increased 43·91 per thousand of men seeking enlistment in the last twenty-six years, which is rather ominous, though this may perhaps be partly accounted for by extra care on the part of the medical Officers inspecting, and may be partly attributable to agricultural depression and bad trade driving many men to enlist that would not otherwise offer themselves, and which enables the recruiting authorities to be more particular as to whom they accept; but it must also, I fear, to a certain extent be attributable to a deterioration in the physique of the town-bred populations, and this is a very grave matter indeed, and one which if it goes beyond a certain point must seriously affect us as a nation. I mention this as going to show that it is imperative on us to consider, and will become so more and more as time goes on, what we are to do, and what measures we should adopt to improve the material we get, and to put it into a condition to meet the requirements of military service.

The Food of the Soldier.

Now it occurs to me that in dealing with this subject of the development of the young soldier, the improving of the raw material, one must, before going into the question of his training, ask, does he get enough to eat, and a sufficient number of meals, or rather, perhaps, are the hours at which he is fed well chosen? The answer is to my mind "No!" In the first place the present ration was fixed at a time when there were at least 90 per cent. of old soldiers in the ranks, many (alas! too many) of whom lived almost as much on drink as on food, and who certainly did not consume their whole ration, and the young soldier in those days got his own share and a portion of the old soldier's as well, and probably got as much as he required; but now, owing to the annual large influx of growing lads into the ranks, ready to devour all their ration and as much again if they could get it, it is extremely doubtful whether the food they are allowed is sufficient to supply the nourishment necessary for immature men.

Now about the hours at which he gets his meals; 8 o'clock for breakfast and 1 o'clock for dinner is all right, but 4·30 for tea, if you do not give him another evening meal, is all wrong. It simply means that he goes from 5 in the evening until 8 the following morning, *i.e.*, 15 hours, without any sustenance, at a period of life when the waste of tissue is greatest and requires constant renovation. If you can't give him another meal, at any rate let his last one in the day be later. I know one of the arguments against increasing the rations is that it would cause a material increase in the Army Estimates, that the British soldier is better paid than any other, and that if only he would spend in purchasing extra food what he spends in drink, that he could get a substantial meal every night of his life. This I grant; but the fact to be recognized is that a very large proportion of men of the classes from which we mostly get our recruits will, if they have a

sixpence in their pockets, go into a public-house rather than a cook-shop, and will buy drink rather than food. The gin-palace offers attraction in the shape of light, warmth, and convivial company, which the other place does not.

This food question is one that is of course more within the province of the medical profession to deal with than mine, but it is so important a factor in the question of the ultimate development and staying power of the man, that I cannot pass it by unnoticed.

We now come to the second heading—

Physical Training: its Objects.

I must impress upon you, gentlemen, that all the remarks I make on the subject of physical training apply more particularly to the infantry soldier, as I consider that once a cavalry or artilleryman is dismissed his recruit's course of gymnastics, the work he gets is sufficient for all practical purposes to keep him in sound condition; and sweeping out stables, wheeling barrow-loads of manure, exercising and grooming one, and perhaps two horses, cleaning and lifting a saddle on and off a rack, and performing the many other ordinary duties that fall to the lot of cavalry and artillery soldiers, renders anything further unnecessary.

One of Napoleon's military maxims was "that the first quality of a soldier is the ability to support fatigue and privation; physical courage is only the second." This shows the value he put upon physical strength. A more ancient authority, Vegetius, said—"It is of much more importance that a soldier should be strong than that he should be tall." Bodily strength, activity, stamina to enable a man to endure privations and protracted fatigue, are as essential to the soldier now as in the days of Xenophon, Cæsar, or Napoleon. How are these to be obtained? I reply by a scientific system of physical training, regulated by the fitness of those who undergo it, progressive in character, and calculated to develop the body to its full power and perfect conformation.

The necessity for a properly regulated system of physical education is recognized and acted upon by most Continental nations, both for their soldiers and in civil schools, but it is of comparatively recent years that it received any attention in England, and we in the Army may, I think, justly lay claim to having taken the initiative in the movement, though we are very far yet from realizing its great importance from either a military or a national point of view. It is about eight-and-twenty years ago that the question was first seriously considered by the military authorities, and shortly after a batch of non-commissioned officers under Major (now Major-General) Hammersley, the father of army gymnastics, was sent to be trained at Oxford by Mr. Maclaren, and on completion of their training, and the building of the gymnasium in the permanent barracks in Aldershot, the military system of gymnastic training was introduced into the Army.

To the ability, energy, and patient labour of General Hammersley is due the sound establishment of the system throughout the whole

Service, and very few have any idea of the difficulties caused by ignorance and prejudice which he had to contend against, and I regret to say that these same causes of obstruction are occasionally to be met with in the present day. I have come across now and again Officers who have had an extraordinary antipathy to the gymnasium and everything connected with it, and who hated their men attending for instruction. They have been few and far between, but still I have met with them, and I have always attributed this antipathy to their not properly understanding the unquestionable benefit systematized exercise is to a man, and the impossibility of the human frame ever approaching full and uniform development without it.

There are two objects to be attained in the physical training of the soldier. The primary one is to make him strong, active, enduring, and hardy; the secondary one is to teach him to apply practically the activity, self-reliance, and strength that the first has given him, to enable him to overcome obstacles and difficulties he may encounter in the field, and to use with ease and skill the weapon with which he is armed. Now to make a man fulfil the conditions which are the object of the first, it is necessary to so work him that the whole, not part, of his muscular system is exercised. Even supposing a man has had opportunities of indulging in the manly games for which this country is famed, he still, to become uniformly developed, requires systematized exercise. For instance, by playing football the lower limbs only are developed. Racquets, lower limbs and right arm moderately. Cricket, lower limbs and right arm principally. Walking, running, jumping, lower limbs entirely. Therefore all these games, grand as they are, and I like to see every fellow play them, only *partially* develop a man. They result in irregular instead of harmonious improvement, certain parts of the body being cultivated and developed to the exclusion of others. Then there is the man recruited from the labouring classes. You will find him more or less developed in those muscles that have been most used in the work by which he has earned his bread, and in the great majority of cases, to the detriment of the others. Our business, then, is to keep in good condition what is already so, and to improve and supply what is bad and deficient. To enable one to comprehend the necessity of systematic exercise, one must understand its effect on the muscular system. Maclaren briefly defines exercise as being "muscular movement produced by muscular contraction, by which every motion of the living organism is accomplished." Our muscular system is composed of voluntary and involuntary muscles. Our frame is composed of myriads of atoms, each of which preserves its vitality for a given period, then dies and is separated from the tissue of which it is a part, and is eventually cast out by the organs of excretion. Exercise, that is, contraction of the voluntary muscles, greatly expedites this process of disintegration, and every muscle put in action causes the decay and death of certain of the tissues composing it. Now were it not for some reparative process, this decay and consequent loss of tissue would of course cause diminution of size and power, but in the nutritive system is the necessary reparation found, and by the conversion of our food into blood, and by its con-

stant and never failing supply, the necessary material for making good what has been wasted is pumped by the heart to every part, to every tissue of the body, and through the medium of the blood what is required for renovation and further increase is carried and deposited throughout the entire frame. By a beautiful and never failing law, during the period of growth, and until the limit of the individual capacity of development is reached, the supply of tissue in a healthy body invariably exceeds the decay, and the body in consequence is constantly being built up and enlarged. From this it will be readily understood that every muscle requires to be put in constant action to cause the necessary and uniform disintegration of its atoms, without which its proper growth and increase is retarded, if not stopped altogether, and this can only be ensured by a carefully arranged system of physical culture.

But not only is the soldier required to be strong, but he is required to be healthy, hardy, and enduring. These are qualities that directly depend more upon sound organs than upon physical strength.

Hear what Sir William Aitkin says in his admirable book entitled the "Growth of the Recruit." "All the parts of the organization of man are connected and correlated together, so that with the increased or decreased dimensions of the whole body, or any particular part of it, certain organs are also increased or diminished or modified, and modifications which arise during the earlier stages of growth tend to influence the subsequent development of the whole man." Every time you put in motion one of the voluntary muscles there is a corresponding action of some involuntary muscles in connection with it, and these are the muscles of the digestive organs, and of the heart, lungs, kidneys, &c., so that the proper condition of these, their health and capacity to rightly perform their functions, depends greatly upon the impulse they receive from the voluntary muscles. Put the organic system into a high state of health and vitality, and you enable the body to resist the evil effects of extremes of heat or cold, or other deleterious influences, and you get the sound, hardy, and enduring man.

Most Continental nations fully realize the necessity of making the soldier active and strong, and it may not be out of place, before examining our own system, to take a glance across the water and see what is done by the different countries of Europe.

Germany.

We will take Germany first. With the Germans as with some others, physical education is not only a military but a national question. The founder of it was F. Jahn, who attributed the crushing defeat of the Prussians by the French at Jena, in 1806, to physical defects on the part of the former, and he made it his business to prepare the German youth for the defence of his country by improving his bodily powers. He it was who laid the foundation of the German Gymnastic Union, now composed of 4,764 societies, and numbering 400,000 associates. At one time these societies were suspected of

Socialistic tendencies, and some of them were suppressed, and Jahn was locked up, only, however, to be shortly set at liberty again, when the movement made great strides.

In 1842 gymnastics were declared to be necessary in all educational establishments, and schools were formed to train masters of gymnastics, one being the central school in Berlin. A section of this school is set apart for the instruction of Officers commanding regiments. Under Officers are also trained there, and every regiment has now to send one Officer yearly, so that in every battalion there are a number of Officers capable of conducting the physical training of their men. Great weight is attached to practical or "applied gymnastics" in the German Army, and the men are continually exercised in them throughout their whole service. No one can deny the fact that physical superiority (the result to a great extent of their excellent physical training) was one of the causes that enabled the Germans in '70–71 to alter the verdict given at Jena.

Russia.

We first hear of gymnastics in Russia in 1785, and some few years after the Emperor Nicholas ordered gymnastic exercises to be practised in the Army, and in 1839, at the great manœuvres near Borodino, gymnastic experiments were tried in the presence of the Emperor, with which he was so pleased that he decorated the Director of Gymnasia with the Order of Stanislaus. However, the system does not appear to have flourished much until after the Crimean War, when on the termination of that campaign, so unfavourable to Russia, it was established in every military school and corps, and it has been increased and improved upon steadily ever since. All recruits are under instruction in peace for four months, and in time of war for two months. The system is progressive, and commences with the simplest exercises, advancing by degrees to applied gymnastics, viz., the overcoming of obstacles, escalading walls, &c., to which they attach very great importance. Here, again, I must draw attention to the fact that the necessity for cultivating the physical qualifications of the soldier was not fully recognized until after an unsuccessful war.

France.

In France gymnastics were first introduced by a Spanish Colonel Amoros, at the beginning of this century, and he founded a school in Paris in 1827. He did not succeed, however, in enlisting any public interest. In 1847 an attempt was made to establish a system in the Army, but no good results were arrived at owing to imperfect organization.

By the exertions of Eugene Pay, Founder and Director of the "Grand Gymnase de Paris," in 1869 the Government were induced to issue a decree making gymnastics compulsory in all schools, but the war of 1870 upset everything, and no good came of it. At the termination of the war, however, France awoke to the necessity of taking

measures to cultivate a strong race of men, and to toughen and improve their muscular fibres, and throughout the country gymnastic societies were founded, now numbering 650, as compared with 10 in existence prior to the Franco-German War.

In the spring of 1878 conferences were held in Paris under the presidency of Mons. Victor Hugo, on the "Education and Instruction of Youth," the outcome of which was, that the Government were induced to make gymnastics compulsory in all schools. The results are considered to be most satisfactory, and immense strides have been made in the physical training of the French.

Here, again, we see conviction on this all-important question brought home to the mind of a nation by a great military disaster.

Austria.

In Austria we find the highest importance attached to the physical education both of soldiers and civilians, it being compulsory in all schools; but as late as 1848 the educational spirit dominant in the country was absolutely hostile to it, and it was not until the year following their humiliating defeat by the Prussians that a proposal made by one Dr. Steiger to establish a compulsory system of physical training in all educational institutions was entertained by the Government, and put in force the following year, since which time it has rapidly and steadily grown to large dimensions.

It would be wearisome to go through the remainder of the list of countries, but it will suffice to say that in Italy, Norway, Sweden, Denmark, and Switzerland, systems all more or less similar obtain, and physical culture is looked upon as necessary as, and also as being an aid to, a man's mental education. Why we, with such a consensus of opinion in favour of it, do not institute a system of compulsory physical education in our Board schools, I am at a loss to understand, but with this I have nothing to do, and allude to it only to emphasize the necessity of a high physical training for our soldiers, for if it is necessary for soldiers of Continental armies, all of them men who have had a preparatory training while at school, how much more must it be necessary for our men, recruited as they are from a population that has no such advantages.

Our own System of Physical Training.

I have found when inquiring into the military systems of the different countries I have enumerated, that the soldier's physical training commences immediately he joins, and it is continued to the end of his service with the colours. There is no such thing as a man commencing a course of gymnastics and being taken away in the middle of it for musketry or military training, to return after an absence of perhaps weeks to begin again, having forgotten much he has been taught, and having lost much of the benefit he may have derived. No, he starts with it at once, and it continues systematically and progressively to the day he is passed into the "Reserve," and he

therefore gets the full benefit out of it, and neither the time, labour, nor money expended on it are wasted. Now, what is our system? By our regulations the "recruit" does not commence his course of gymnastics until he has completed his recruit's drill and been put through the recruit's course of musketry. What is the result? Why he is a trained soldier in every other but a gymnastic sense, and when he does join for instruction he is liable to be withdrawn at any moment for military training or for the annual course of musketry, and he is grudged by his Commanding Officer and Adjutant because he is not available for parades, guards, field days, &c., and the consequence is that the gymnastic training is viewed by some Officers with disfavour, not on account of any demerits of its own, but for the reasons I have mentioned. There is another serious disadvantage in not conducting a man's gymnastic training concurrently with his recruit's drill, and it is this, that "drill," *per se*, does little or nothing to supple and strengthen a man, but as regards certain muscles rather the reverse, and the present extension motions won't do much good in that direction either; so for the first three or four months after a man joins you may say that next to nothing is done to give him either strength or flexibility of limb.

In the drill necessary to prepare him to take his place in the ranks you teach him to walk uprightly and stiffly, to look straight to his front, and to hold his arms rigidly by his sides. In fact you constrain his every movement, and you deny to the trunk of his body and to his upper limbs any exercise or freedom of movement whatever, thereby stopping that action of the muscles which I have endeavoured to point out is so necessary for their development, and this at a period of his career when you should be using your best endeavour to encourage it. The recruit's course of gymnastics is supposed to last three months—say sixty-six working days—but the actual number of lessons that a man gets is most likely not more than fifty or fifty-five. It is obvious, therefore, that every hour he attends must be devoted to the one object of making him strong and active, and in teaching him to co-ordinate his movements, a thing many men cannot do; and there is absolutely no margin left for making what should be the next step in his physical training, that of teaching him how to apply practically what he has learnt. It is, however, a great point gained to have partly attained our primary object—that of making him stronger; and one must have constant opportunity of observing the beneficial effect even under our present system that the training has upon men, to fully realize its importance.

Instances of men not showing a decided improvement as regards development, power, and activity are rare, and the following figures I think prove conclusively that great good has accrued to them generally.

Among the 15,504 men that completed their full course of training during the past year in the gymnasia in the United Kingdom, the average increase was:—Weight, $2\frac{1}{2}$ lbs.; chest measurement, $1\frac{1}{8}$ inches; forearm measurement, $\frac{1}{2}$ inch; upperarm measurement, $\frac{3}{4}$ inch. So you see that in less than three months these boys increased in chest

girth almost as much as Doctors Balfour and Lawson gave them five years to do in before the gymnastic training was introduced. Does not this speak for itself? I could give you any number of cases in which the increase has been simply extraordinary, but will confine myself to one or two of the most wonderful on record.

There is a marine now under instruction at Walmer who on the 16th of February was 32 inches chest girth, $9\frac{7}{8}$ inches forearm, $10\frac{7}{8}$ inches upperarm, and on the 14th of last month I measured him, and he was $36\frac{3}{8}$ inches round the chest, $10\frac{3}{8}$ inches forearm, and 12 inches upperarm. Here is a leap physically from boyhood to manhood in less than three months.

Among the twelve non-commissioned officers who went to be trained at Oxford under Major Hammersley, the average increase in seven and a half months was 10 lbs. in weight, $2\frac{7}{8}$ inches in chest, $\frac{3}{4}$ inch in forearm, $1\frac{3}{4}$ inches in upperarm, and one of the number, aged 19, increased from 33 inches to $37\frac{1}{2}$ inches; and another, aged 24, when he commenced measured 35 inches and when he finished was 40 inches round the chest, an increase of 5 inches in a little over seven months. It is needless to say they required new tunics, &c., and I hope the country paid for them; but imagine what these figures mean. They represent not merely an increase of muscle, but an expansion of the osseous framework upon which the muscles lie, an enlargement of the chamber of the heart and lungs, thereby providing these with more space for functional activity and growth.

I have seen curious specimens join, men who have never used their limbs in their lives, who have never properly inflated their chests, and who, though they have been passed as medically fit, when put to the test of physical work proved practically useless as soldiers, but in these extreme cases I have invariably found that all that was required was careful training, and extra time in training them. I remember one case of a man who could not jump over a stick 2 feet from the ground, and could scarcely bear the weight of his own body when hanging on a rope. The Officer commanding his regiment tried to get rid of him, but he was ordered to be kept at the gymnasium for another course of instruction, and at the end of eight or nine months was so improved that there was no further talk of discharging him.

Up to the present I have spoken chiefly of gymnastics, because it is unfortunately almost the only physical training the soldier now gets, excepting "Running drill."

Now "Running drill" is doubtless highly important, and every soldier worthy the name ought to be able to run his 1,000 yards in seven minutes without being too distressed at the finish to use the bayonet if necessary, but only very gradual and continuous training will get him into such condition, and too much care cannot be taken in exercising the men at this drill. For instance, if you take a man or boy, whichever you prefer to call him, in the early morning to run round and round the barrack square until he is sick, you are doing him serious and perhaps permanent injury, and laying the seeds of future disease.

After just rising from his bed his muscular system is relaxed, and not ready to withstand such fatiguing exercise, and his heart and lungs are unprepared for such quickened action, for such increased rapidity of respiration, and to aggravate the mischief this is all done on an empty stomach, after a fifteen hours' fast.

Don't misunderstand me, and imagine for a moment I wish to suggest that this is the manner in which Running drill is usually conducted by regiments, but as I have known cases where greater discretion might certainly have been shown, I wish to call attention to the danger attending the absence of proper care, and also I object to the practice of running a young soldier on an empty stomach. Run him in the forenoon or afternoon, and run him to music, and give him something to think about while running, in the shape of simple changes of formation, &c., and you will attain your object without unduly fatiguing him.

When once he is dismissed his recruit's course of gymnastics, nothing more is now done regimentally in regard to keeping up or improving his strength, and he may or may not attend at the gymnasium for the drilled soldier's course that he is supposed to annually undergo; one reason being that he is very likely quartered in a place where there is no school, or his regiment is broken up into detachments and he can't be spared, the duties being so heavy, and for various other reasons.

Now in my humble opinion that is a grievous and deplorable mistake, and if not remedied we shall one day pay very dearly for our shortcomings in this respect.

Reform is needed.

There are, however, many difficulties in the way of bringing about "reform." One is to convince men that it is necessary, and the only way I can hope to do that is by endeavouring to get them to think over the question, and to give them digestible food for thought, and a great step in the right direction will have been made if only a deeper interest in the subject can be aroused in the minds of Officers, and if they will only give the subject the consideration it deserves, they cannot fail then to see its importance. The next difficulty is that mystical body entitled the "Treasury," the stumbling-block of all practical reform, the rock upon which the good ship "Efficiency" so often founders. Many a good practical scheme is blocked and comes to naught because of the cry "there is no money," but it does not do to be daunted by obstacles of this sort, and the only way is to hammer on, and in time one generally gets a portion, if not all, that one wants. But the great thing is to know what you want, and I am thankful to say that I do know what I want, and it is this—I want to see our present system altered, improved, developed. I want to see the fact recognized that it is no use to drill a man, no use to give him a costly arm of precision, no use to teach him to shoot, in fact, no use to teach him anything, unless you first make him strong, active, enduring, and self-reliant. Physical strength, endurance, and discipline are the first qualifications of a soldier, the foundation upon which the whole structure of his efficiency is built.

The following is the sort of system that I should like to see established, without of course entering into minute details, as time will not admit of my so doing, and I do not lose sight of the fact that time, money, and many preparatory measures are necessary before what I hope to see one day authorized can be put into practice; but the sooner the ball is started rolling the better, and I hope and believe that it has begun to move in the right direction, and for this we have to thank the General Officer Commanding the 2nd Brigade at Aldershot, whose warm co-operation has most materially assisted us in overcoming many difficulties.

I should like to see in all barracks of any size good large drill sheds erected, fitted with some portable apparatus, in which the soldier's training could be carried on at all times, and without regard to the weather. I should like to see every regiment in the Service obliged to send one Officer and two non-commissioned officers to be trained in the Headquarter School annually, so that in a short time there would be everywhere a sufficient number of regimental Officers and non-commissioned officers capable of undertaking the instruction of their men. I want every man on joining, whether his regiment or his depôt, to be at once taken in hand, and *pari passu* with his ordinary drills, receive one hour and a half's physical training every day of the week, Saturday and Sunday excepted; three-quarters of an hour in the forenoon, and the same in the afternoon; this training to comprise elementary gymnastics proper, free movements (not the present extension motions), the rapid march—170 paces to the minute—the high balance step, running drill, practised differently to the way it now is; and when the men are ready to carry arms, the free movements to be performed with the rifle. Then as the men become proficient, the different squads should be massed, and the various series of exercises performed to music. When first this proposition was made, considerable doubts were entertained by some as to whether the correct performance of these several exercises to music by any large body of men would be found practicable. This has been put beyond question by the Officer Commanding the 1st Battalion Northamptonshire Regiment, which battalion does a variety of free movements, with and without the rifle, to music, in admirable time and with great precision, and H.R.H. the Commander-in-Chief expressed his great approval of the practices when he saw the regiment perform them, and authorized their adoption in the Division at Aldershot as a tentative measure, and after a two months' trial the reports received from the several Commanding Officers have been very favourable.

So much for the *recruit's* training. By this time he should be fairly active, supple, and strong, and he should be in a condition to be instructed in the practical application of the exercises he has been taught in the gymnasium. For the use of the *trained* soldier there should be in every barrack square "walls" similar to those which, on my recommendation, were built outside all gymnasia last year, with the object of teaching the men to escalade by "mutual support," and there should also be ditches for them to jump over, banks for them to jump off, bars for them to vault over, with first one hand and then

the other, sometimes to be taken in their stride when at the double, and all these exercises to be practised with and without the rifle, and there should be issued to every regiment a certain number of old rifles for this purpose. The changes should be rung on these several exercises, and every *drilled* soldier should receive two hours' instruction a week throughout the year. If this were thoroughly and intelligently carried out, I am as convinced as that I stand here, that the improvement in the physique, activity, and self-reliance of the men would be markedly apparent in a very short time. Remember also that if all this be done in a proper manner, the men can be trained to work and drill with great rapidity and precision without loss of cohesion, as each man's individuality will be developed, and his intelligence sharpened, and, what is equally important, his interest in the work will be enlisted, and the dull monotony of the present routine relieved.

Dr. Warre in his able lecture, which he gave at Aldershot, on the History of Tactics, in speaking of *minor* tactics, said: "These again have drill as their ultimate foundation, and depend for their success very largely upon its perfection," and I say that *it* again depends largely for *its* perfection upon the physical training and condition of the men.

Then there is another thing that I cannot help thinking is a very great mistake, viz., that more encouragement is not given to the infantry soldier to become efficient in the use of the bayonet. I have heard it argued that he should never actually defend himself with it, but should rely on the quick shooting power of his rifle; if so, why give him a bayonet? But if you do give him one, you should teach him how to use it, which I maintain you don't. I think that the Government ought to give prizes for skill in the use of the bayonet, on somewhat the same lines as prizes for swordsmanship are given in the cavalry, and the winners of regimental and company prizes should be allowed to wear crossed bayonets on the arm in gold or worsted. You may rely upon it that it would be attended by very good results, and apart from the benefit to the individual, we should not see, as we now do, more cavalrymen and artillerymen enter for the bayonet competitions at the several tournaments and athletic meetings than infantry.

As I have previously said, more Officers and non-commissioned officers qualified to instruct are required in every battalion before the system I advocate can be established, and before these could be instructed it would be necessary to build us a large, properly planned Headquarter Gymnasium and "School of Arms" at Aldershot, as in the wretched place we have at present (one of the worst in the kingdom) we have not room to train in the way I should wish the numbers now attending, and it would be simply impossible to take on many more. Among other innovations, I am anxious to have an Officer of the Army Medical Department specially detailed to give a series of very simple lectures on anatomy, the muscular system, and circulation of the blood, &c., and a few practical lessons in the art of bandaging a fracture or dislocation in the event of an accident, for

the benefit of the Officers and non-commissioned officers qualifying as superintendents and instructors, so that they should know what to do, and what not to do, in cases of emergency, until medical assistance could be obtained. But a quiet room must be provided before this can be done, as it is impossible to teach men subjects of this sort in a small building where from 1,500 to 1,800 men are trained in the week.

I am convinced that a system of training of the character I have described is a great and pressing want in the Service at present, and this is admitted by many Officers of high position and great experience, and I may say that I have not met with a single Officer who has given the subject any thought, with whom I have discussed it, who has not admitted its necessity, although perhaps not agreeing altogether with me as to its practicability, or as to the method of carrying it out; but that sooner or later it will be accomplished I do not for a moment doubt.

If these few words of mine make any favourable impression on the minds of some of those who have hitherto not carefully thought over the question, or who may not for reasons of their own be in favour of what I advocate, or who have considered it one of secondary importance, I shall be more than repaid for the trouble I have taken in preparing this paper. Depend upon it that (other conditions being equal) at the critical moment, when victory is trembling in the balance, the scale will be turned in favour of the commander whose troops are the most physically fit, and it is false economy on the part of the nation, and cruelty to men, to expose them to the hardships and privations of war, to the fatigues and exhaustions incidental to a campaign, without previously fortifying their constitutions, and storing up for them that reserve of vitality, strength, and endurance, upon which they will assuredly have to draw, and without which they must inevitably break down. As the "Daily Telegraph" said a short time ago, "We may devise systems of military defence, but in the long run they will mainly rest on the 'pith' and 'sinews' of Englishmen." It should therefore, I say, be our care to ensure the "pith" being sound, the "sinews" tough.

A few more words and I have finished. We have, I believe, in our young soldiers a splendid material to work upon, and, as we know, it is a costly one; let us therefore economize it. At the early age we take them they can be usefully trained, but we have it on the highest authority that no man under twenty can be regarded as an efficient soldier, or fit for active service. We should, therefore, train him very slowly and progressively, asking him to do nothing beyond his powers of endurance, and we should gradually effect the adaptation of his heart and lungs to the unaccustomed labour they are called upon to perform. Lastly, we should encourage him to play cricket and football, and all other manly games, to bathe and learn to swim whenever an opportunity offers, and by every means in our power let us wean him from drink and dissipation by offering him strong counter-attractions in the shape of wholesome amusements of an evening in barracks, and we should make the best arrangements we can to enable

him to get a square meal at night at the lowest possible price, and rest assured that the reward of such exertions will be less crime, higher morality, and greatly improved physique.

If we only go the right way to work, I can see no reason why it should not be said in the future, as it has been in the past, that the British infantry is the finest in the world.

General GEO. ERSKINE: My Lord, ladies, and gentlemen, before we enter upon the discussion of the paper to which we have just listened, I hope that I may be allowed to express the gratification which the Council of this Institution has had in acquiescing in the proposal that was made to it that a paper already read in the Military Society of Aldershot should be reproduced in this theatre. The object of this Institute is to further the attainment by the Officers of the Army and Navy of professional and scientific knowledge, and I think, my Lord, you will be one of the first to acknowledge that that object has been kept constantly in view. It is, therefore, as you can understand, with great pleasure that the Council has seen the growth of a kindred Society, in one of our largest military stations, and we are quite prepared to hold out to it the right hand of fellowship, trusting that, the work which we and they have to do being identical, we shall proceed harmoniously in the prosecution of it. I think I may say that if the paper which has been read here this afternoon is a specimen of the papers which have been produced from time to time in the Military Society of Aldershot, we have reason to congratulate that Society on the success which it has attained. I am sure there will be no difference of opinion here as to the paramount importance of the subject which the lecturer has taken in hand. It is a subject which every Officer of the Army should make himself acquainted with. I will not stop there, but will echo what has been said by the lecturer as far as I could gather his meaning, that the private soldier of the Army should also be fully instructed in these matters in order that he may comprehend and value as he ought the benefit which he obtains personally from the training which is given him. I shall be very glad to observe hereafter the success which may attend Colonel Onslow's efforts to extend the sphere of usefulness of his department. I observe that he apprehends that great difficulties will arise from the Treasury—the Treasury we know is a very conservative body, and sometimes it is called obstructive, but my experience teaches me that it does not quite deserve all the blame that is thrown upon it. I think sometimes that blame ought to be laid upon other shoulders. However that may be, I do not think that what Colonel Onslow has sketched out in his very able paper would entail any great expense, certainly not an expense disproportionate to the very great benefit which he would by the prosecution of his plan confer upon the Army. I apprehend myself that his difficulty will be in obtaining opportunities for carrying out his plans, because, as we all know, very great demands are made upon the time of our soldiers in the shape of "guards" and "pickets" and "fatigues," and in those things which are included in the very ambiguous and comprehensive term "garrison or regimental employ." But I think that Colonel Onslow may look forward with hope to obtaining the time that he will require for the prosecution of his plans by inducing the authorities, whoever they may be, to transfer to him some of the time which is now expended in the ordinary drills of the Army. We have heard, many of us with very great pleasure, what has been shadowed forth from time to time in regard to the expurgation from the field exercises of many useless movements which require a great deal of time on the part of the soldier to learn and to practise, and I think that when those movements have disappeared he may find that there will be some further opportunities given him for the work of his department. In saying that I would not have it understood that I undervalue in any way the importance of drill; I look upon it as a thing that should be insisted upon to a very great extent, principally for the reason which I think most old Officers would have in their minds, that it conduces to the attainment of discipline, which after all is the principal thing we have to teach our soldiers. But surely in this respect the athletic and gymnastic exercises which Colonel Onslow proposes to extend and carry out with greater efficiency than heretofore would be equally conducive to the

attainment of discipline with the ordinary drill of the Army. I therefore hope that he will be encouraged to persevere in his endeavours to realize his views, which I think are sound. I am sure he is on the right track, and I for one will be very glad to observe any success which may attend his work.

Major-General PHILIP SMITH: Having had something to do with the development of physical training at Aldershot, I may perhaps be allowed to say a few words. I think there is great encouragement in the fact that Commanding Officers in general recognize the importance of it and have given the proposed system every support, and I think the reason of this may be because they have seen the men taken on service, and the greatest demands made on their strength without any due preparation. Up to the present time the only preparation has been the balance step and extension motions. The object of the balance step is to teach the slow march. The object of extension motions is to "set men up." The slow march is certainly not very useful on active service, and as for "setting up," it is altogether wrong to make "setting up" the object of drill. It should be the result of drill, but the object of drill should be to make men strong and active. When strong and active, as a matter of course they become "set up." One of the most important parts of physical training is the effect that it has on the character of a man; if a man is a weakly man you cannot expect that he will be very anxious to get in close contact with his enemy, and the great object of drill is that you may place your man in contact with the enemy. If he is a strong man he thinks if he can get at him he will overcome him; but if he is a weakly man he is very glad to remain at a distance, because perhaps he feels that if he did get near him, instead of overcoming his enemy, his enemy would overcome him. Various points mentioned by Colonel Onslow are, I think, extremely important, and I would refer in the first instance to the question of rations. My opinion is that the tea meal is not of very great use to the soldier. I think we could get more work out of him and he would do his work much better if he had his dinner later. I know it is urged that the class from which soldiers are enlisted dine early. I do not think that is an objection, you take the soldier from the plough, train his body and mind, and I do not see why you should not train his appetite as well, if it is better for the service and for the work that he has that he should dine late instead of early. My notion is that you should give the soldier his breakfast at 8, his luncheon at 11.30 or 12, and that he should dine when work is over, at 4·30 or 5 o'clock. The matter of pay naturally comes into account. If you give him his pay weekly he will very likely do one of two things, he either sends the money to his friends or goes out and has a lark. Neither of these is what the money is meant for. I think his money is meant to make him fit for the service of the State, and if he got the sixpence every morning the chances are he would spend that on his extra food instead of sending it to his friends or spending it on a lark. General Erskine referred to the time that the exercises would take and the expense that would be incurred. As regards time, I think the great object in the training of soldiers should be that we should teach them what would be of use to them in the field. The soldier is a fighting animal, and all you teach him which is not of use to him as a fighting animal is more or less a mistake. I am glad to see that a great number of changes have been made in our drill book in the omission of a large number of movements that are useless. As that is the case there will be plenty of time to develop the soldier by physical training, which after all is the groundwork of his training. As regards expense, I am glad to think a very large part of Colonel Onslow's system can be carried out without any expense at all. I should say the whole of the exercises which he proposes instead of the extension motions, and the whole of the exercises with the rifle, are the most important, and these can be done without any expense and they can be done under all circumstances. Before I sit down I think I may beg General Erskine to accept my thanks on behalf of the infantine Society at Aldershot, for the kind words with which he mentioned it, and to say that I hope that it will follow worthily in the steps of the Royal United Service Institution.

Brigade-Surgeon MYERS: As one of the younger school, and having had the advantage of experience with the Guards in my service, I have followed very closely the recruit up to the old soldier, and I should like to say a few words on this sub-

ject, as it is of great interest to me. And first with regard to disease amongst soldiers. I as a medical Officer have taken interest in disease more especially. With regard to the diseases of the soldier, there is no question that they have greatly changed. The diseases we saw in early days we do not see now, and this is to the benefit of the soldier. I refer especially to aneurism of the heart and of the aorta. With regard to the physique of the soldier, I think twenty-nine years is a good experience, and certainly I can maintain that the physique of the Guards at the present day is better than it was in my young days. With regard to the increase of weight of the soldier and the size of chest, I think there may be great difference of opinion about that. The food unquestionably, independent of exercise, increases his weight and size. I have kept for two years most carefully the size of chest of recruits on enlistment in the Foot Guards, and again after three months' service at the recruit depôt; I have also kept their weights, and it has been surprising to me to frequently find that healthy recruits have increased from 6 lbs. to a stone in weight in this short time. That must mean an increase of measurement. Of course their muscular training develops them also, but in the case of which Colonel Onslow spoke, the great increase of measurement from 32 to 36½ inches, I should like to ask Colonel Onslow whether he measured that man when he was 32 inches or whether he was measured by other people. Again I should like to know as to that increase from 35 to 40 inches whether that was in a man twenty-five years of age, because as a medical man I could not admit that that could be due to an increase, as I think he stated, of the bony chest walls. At that age the chest is practically formed, and I cannot imagine that the chest wall had increased to such an enormous extent. I think it must have been due chiefly to muscular development. [Colonel ONSLOW: Both.] There can be very little increase of the bony walls of the chest at that age: it must be muscular development. It is very difficult to form an opinion if different people measure, because, however carefully they do it, discrepancies will creep in. Again, with regard to the food, it has been accepted, I think, for a long time past by the medical profession that the food of the soldier is not sufficient, and if we give this increase of labour to him by gymnastic exercises, we certainly ought to give him more food to counteract the strain upon him. At Caterham very great care is given to this matter; the recruits buy food largely, and the extra consumption of bread by them has been a great surprise. In the old days soldiers threw away bread, but in the present day they purchase it. I should like to see the soldier given a ration of cheese. The expense of an additional ¼ lb. of meat would be very great to the country, and I am very doubtful, although it might be advisable to give him an increase in meat, whether it could be sanctioned. But possibly a ration of cheese would in a measure meet the case; it certainly would be very wholesome and beneficial for the soldier.

General Sir ROBERT HUME: Among the important points which the lecturer has brought before us, perhaps the most important with reference to the physique of the young soldier is the one that has been mentioned, that he should have sufficient sustenance, and then the question comes, how is it to be supplied? It must either be done by the Government or by the soldier himself. I think there is not the slightest doubt that the young soldier from seventeen or eighteen years of age till twenty-two or twenty-three should have an increased ration of meat. I do not see why for that class of soldier it should not be supplied by Government except of course the question of expense, but if it were supplied by Government I should limit it to that class of soldiers at a certain age while they were undergoing certain exercises. All of us in the Service know the benefit that is done to the soldier and to his physique by the admirable system of gymnastic training which has been introduced and which is carried on in the Army. In India there is not the slightest doubt that the men themselves provide an immense quantity of extra messing at their own expense, and every facility is given them by fitting up rooms and having what we call coffee shops and good cooks for cooking the extra rations which they provide, and I think myself that they do in India provide themselves with a sufficient quantity of food. Of course there is this to be said in comparison between India and serving at home, that there are not the same attractions outside barracks and cantonments there for the men to spend money in that there are at home, and that they spend their money there on what they feel they actually want, and that is increased

food. There is not the slightest doubt that in our regiments at present,—and it is increasing every day,—much is done to induce the soldiers to spend their money on what is really good for themselves, and I do not think that too much can be done to encourage Commanding Officers in carrying out everything they can do, to make the attractions of the barracks as great as possible, and to induce the men to spend their money in the regimental coffee shops, and in the purchase of articles which really do them good, instead of spending it outside. This is done to a very great extent I know through the Service, and is very beneficial to the men.

Colonel Sir LUMLEY GRAHAM, Bart.: I am, as you know, a soldier of the past, not of the present, but still I should like to say a few words on the present and the future. I was very much pleased indeed to hear that excellent lecture of Colonel Onslow's—pleased not only on account of the lecture, in which as far as I am able to form an opinion I agree almost entirely, but also as being one of a series I may say which have been given lately which show what progress is being made in the Army—progress in I think practical ideas, in doing away with the old feeling which really existed when I joined the Service, that everything was for show; we did not think of anything beyond show. Now, I am happy to say, we have awoke to the idea that soldiers are not meant for show, but they are meant for use. Therefore I welcome very much such a lecture as that which we have had the pleasure of hearing, which is entirely devoted to making the soldier more useful, setting aside the idea of show. Of course we want the soldier to look well, as we have to consider the "pomp and circumstance of war," and all that sort of thing, but we must not sacrifice utility to show. There is another point which struck me very much in Colonel Onslow's lecture, namely, the way in which he dealt with the necessity for progressive and constant training in physical matters. At present I believe from what he says and from what I know myself the training is merely for a short time at the commencement of the soldier's career, and practically very little is done afterwards to train him physically. No doubt the necessity of keeping up a constant training is most necessary to enable him to endure fatigue, to make him fit to march, for one of the most important things a soldier has to do is to march, and I doubt very much whether the English soldier when he first goes on a campaign is as well qualified to march as the soldiers of some other armies; they have more training in that, and even those little French soldiers, whom we are apt rather to look down upon as very tiny fellows, are wonderful men to march. I am afraid as a general rule you would find a regiment of French soldiers would march away from a regiment of English soldiers, and that probably is a good deal owing to the greater amount of physical training that they have than our soldiers. It is not from more food, for no doubt the English is fed better than any soldier in Europe, I think there can be no doubt of that. He may not have his meals at the right time, but he has more food I am sure than any soldier in Europe. He would no doubt do better with more still. There were facts mentioned by a medical Officer who spoke, which seemed to show that at present at any rate the soldier thrives very much upon the food that he gets. It must be remembered that most soldiers who join the Army have been accustomed to very meagre diet indeed. The agricultural labourer or the poor workman in the town, who form the bulk of our Army, have not been accustomed to a large allowance of meat, and when they come into the Army they as a rule get very much better food and much more of it than ever before. And we see how the young recruit develops. I have seen quantities of young fellows who joined as perfect weeds grow into very fine young men after two or three years. I think that is a great deal owing to the food they get. But still we have always recognized the fact in the Service that the more work you put upon a soldier the more food you must give him. On service in the field we increase the meat ration, and I think that of bread too, and we give him a number of other little things. No doubt if we increase the physical training, particularly of the young soldier, we shall have to increase his food also. Whether it is better done by giving an extra quarter of meat for dinner or something more for the evening meal I won't profess to say, the doctors will have a good deal to say to that question. I think that was an excellent remark of Colonel Onslow's, that if you work men hard early in the morning you ought to give them some food before they go to that work. I found that the case in India when commanding a battalion there. I found that

early morning parade (as every one who has been in India knows we go out soon after daylight and knock the men about for an hour or two), this exercise on an empty stomach was very trying indeed, so I made arrangements (and I believe it is done in most regiments) for the men to have a light breakfast before they went out, and I have no doubt it was a great benefit to them. I am quite sure if a system such as Colonel Onslow has advocated to-day be carried out in the British Army, it will add very much, not only to the physical power of the Army, but also to its moral power.[1]

Colonel ONSLOW: I am very pleased, my Lord, to find that the majority who have spoken to-day seem to be somewhat of my opinion, although perhaps differing with me on some small details. I am asked by a medical Officer of the Guards, whether I measured the marine recruit at Woolmer when he only showed a measurement of 32 inches round the chest. Well, I did not. It is a very natural question to ask, because although I measured him the second time still there might be a great difference in the way in which he was measured. I did not actually measure him the second time myself, but I had it done in my presence by the same Officer who had previously done it, and he measured the man three times strictly according to the regulations which we lay down to be followed, and there is every reason to believe that the measurement in the first instance was correct, because the man was *under* the standard chest measurement. If he had been 33 inches, no further notice would have been taken: and he would have been put down as 33 inches; but as he measured 32 only they measured him three times over to see that they were not wrong; because if a man is under 33 inches a report has to be made on the subject. The natural assumption therefore is, that the first measurement as made by an experienced Officer was correct, and although there may have been some slight difference in the measurement, still for all practical purposes I believe it was correct. General Erskine has said that a great deal of blame is thrown upon the Treasury which ought not to be thrown upon it. Well, General Erskine of course has very much more experience of the Treasury than I have, but still I have some slight experience, and I know many proposals which are practical enough and which have been supported by the military authorities, by Lord Wolseley and others, have been stopped on account of the old cry "want of money,"

---

[1] The Russian soldier got in peace time in 1882 two warm meals a day, at noon and in the evening. His daily rations consisted of 2·09 lbs. of flour, 0·23 lb. of peeled barley, 0·05 lb. of salt. He baked for himself, and the allowance of flour was calculated to make 2·73 lbs. of bread or 1·67 lbs. of biscuit. He was in the habit, however, of selling a large part of his flour and of buying other things with the proceeds. He also made a liquor called kwas of the flour and leaven, which he drank with his meals. He got in addition ½ lb. of meat on 196 days of the year, the remaining 169 being fast days. I see that the above statement agrees with that given by Colonel Tulloch in his lecture upon soldiers' food (see "Journal R.U.S.I.," vol. xxviii, p. 889). It seems surprising that the nutritive value of the Russian rations should be about 50 per cent. higher than that of the English rations (as given by Colonel Tulloch) when we compare the total amount of each and the ingredients which compose it, but we must I suppose bow to the chemical analyst and accept his dictums, which, according to the table given by Colonel Tulloch, and apparently quoted by Colonel Onslow, proves that though the British soldier receives in peace time a larger ration than any other European soldier except the German, the nutritive value of his food is considerably less than that of the food supplied to the soldier of any other Army. If the analysis is really reliable a clear case for reform appears to be made out. At the same time, however, we must not forget that the British soldier has far more "pocket money" than any other soldier except the American, and has thus the power of purchasing extra food to a greater extent than the foreigner, with that one exception, a power of which he generally avails himself, in consequence of which we see amongst other things upon the mess bars, butter, cheese, and bloaters, the last-named article being in great request amongst our poor, and deservedly so, as it is said by the analyst to be more nutritious than beef.—L. G.

and it is said, "This is to be put forward next year or the year afterwards," which means practically you may put it forward when you like, but you won't get it; therefore I think a very great deal of blame is to be attached to the Treasury. Of course I do not know *who* it is that actually puts the veto upon these things, but somebody or other, perhaps a clerk, says, "There is no money and you won't get it." That is all I say. I believe there must be something wrong, and I prefer in nine cases out of ten to throw the blame upon the Treasury, and I do not think I am far wrong. General Erskine, I think, pointed out that there is great difficulty in getting time for carrying out the system that I advocate, viz., that of giving the soldier additional physical training, and doubtless under the present system there is difficulty; but as I said in my paper, if we can only get the regimental Officers to think over the matter, and if it only will commend itself to them, and they like it, you may depend upon it we shall very soon have physical training intelligently and scientifically carried out in the Service; but until it is recognized by the regimental Officers you won't get it; as it is no use making regulations and calling Commanding Officers' attention to section so and so, for if they do not like a thing in most cases there won't be very much done. My object therefore is to get the Commanding Officers to like it in the first instance, and as a rule if things are sound the majority of Commanding Officers, I am thankful to say in the British Army, do like them, and assist in carrying them out. What I am driving at is, to so bring it forward that they may think about it, and if they like it you will find it will come. Then again there was a remark made about "setting-up drill." Now if there is one thing that I abhor in the whole of the Regulations, it is that "setting-up drill." It is an iniquitous and wicked drill, and I believe any doctor will tell you the old method of setting up the soldier is the cause of more heart and lung disease than anything in the whole drill book. He is put into a constrained, an unnatural and improper position, and he is kept there for a very considerable time with his chest blown out. He takes a deep inspiration of the pure air that God gives him to nourish him and do him good, but he ought as soon as possible to get rid of it again, and the sooner the expiration follows the inspiration, the healthier the man will be, and the sounder his lungs will be. But at setting-up drill he is told to stand with his hands at his side, his chest thrown out, with his body resting on the fore part of his feet; and for the purpose of keeping his chest expanded to fulfil the requirements laid down by the drill sergeant, he has to keep the air *in* his lungs, instead of letting it go out. I think if there is any doctor present he will corroborate my statement, when I say that this drill is at the bottom of a great deal of the heart and lung disease that we unfortunately have in the Service, and I hope soon to see it done away with. If a man's muscles are in good condition and he is sound and is properly and intelligently drilled, he won't want any "setting-up" drill, because he will be able to stand up like a man. If he is a strong chap a very little "drill" will make him walk uprightly, and you do not want a fellow to walk about like a trussed fowl, you want him to walk about like a soldier. Before, however, you can get your fellows to walk naturally and properly, you will have to change their dress, because their present dress is not one that they can fight or do anything else in properly. Remark was made referring to the question of soldiers' messing, that at Caterham they get lots of opportunities of buying good food. I know the system there is most excellent. The men look very healthy and they are a very fine set of men, though the physical training of the soldier there is not as well conducted as it should be, because they have not the means of conducting it properly, but notwithstanding this the men improve wonderfully. But you must remember that they are living under very excellent sanitary conditions: they have splendid air, a grand dry canteen where they can go, and they have comparatively plenty of money in their pockets, because they cannot spend it anywhere else. There they are at the top of a hill, and there is nothing to induce them to go down it; there are few gin palaces, &c., about, and as a man is probably as hungry as a hunter he goes and spends his money in grub, and it is a very good thing that he should: but I think you should not ask the soldier to spend his money in food, you should *give* it to him, because although 90 per cent. of the men may spend their money in food, the other 10 per cent. may not, and those 10 per cent. are the men who will break down when on a campaign, and with 10 per cent. of your force as

sick men in ambulance, well, nobody knows better than Lord Wolseley does, the trouble and anxiety that they are to a commander; therefore it should not be left to the soldier to spend his money in food, but you should give him what is necessary, and I think most Officers agree with me that the soldier does not get enough food. Sir Lumley Graham thinks that the English soldier is better fed than any other, but I think Sir Lumley will find that such is not the case. The British soldier, I believe, is not better fed. I have here a statement taken from "The Soldier's Rations," by F. de Chaumont, in the "Sanitary Record" of February 5, 1876, and he makes a comparison with other nations' soldier's ration, and the English soldier's ration. He says the English soldier's ration of water-free food is 23·19 ounces, the French 24·74 ounces, the German peace ration is 24·80; the Austrian 23·30, and the Russian 34·30: so that any one of these nations gives their soldiers more water-free food than we do.

Sir LUMLEY GRAHAM: What is the meaning of "water-free food?"

Colonel ONSLOW: The weight of the food, when the water is subtracted from it.

Sir LUMLEY GRAHAM: All the armies you mention give a smaller meat ration than ours.

Colonel ONSLOW: I cannot tell you exactly.

Sir LUMLEY GRAHAM: Will you go into that subject?

Colonel ONSLOW: I will go into it and will communicate with you, because I can obtain the information very easily. Although it is generally supposed the English soldier is better fed, practically, I believe, he is not.

Sir LUMLEY GRAHAM: In the Crimea I think I am right in saying the French soldier only received ½ lb. of meat and the English soldier had 1 lb. The French soldier had 1½ lbs. of bread and the English only 1 lb. We had more meat and they had more bread.

Colonel ONSLOW: However, I will go into that. I do not think there are any other points for me to notice, I will, therefore, conclude by thanking you all for your very kind attention, and the interest you have shown in the subject; and I again beg to express my thanks to General Erskine and the Council of the United Service Institution for having given me this opportunity of speaking; and I have to thank you, my Lord, for your presence here to-day and the kind support you have given me.

Lord WOLSELEY: I am sure, ladies and gentlemen, we have listened with very great pleasure and interest to all that Colonel Onslow has told us on this extremely important subject, one which concerns not only the Army, and I may say the Navy also, but the whole general population of this country. I have listened to his criticisms upon our present regulations in the Army with attention, and I frankly admit that I am in accord with a great number of them. I only wish it were possible to carry out in its entirety the system which he has proposed, as I am quite certain it would bring about a great number of those changes to which he has referred, and which I know would be valuable. In fact, I may say that I endorse almost all that he has said upon the great advantages which accrue to an army and to a people from a good and sound system of physical training. He referred in the course of his lecture to a point with reference to training, which interests not only this Institution, not only those who are present here, but as I have said, the whole population generally, namely, that it is a great pity we cannot add to the instruction given in our Board Schools in Great Britain some system of physical training. We hear a great deal about technical training being added to the existing system of general education, and I think it ought to be the duty of all of us, of every man who is a taxpayer, quite putting out of question the fact of our being soldiers, to use all the influence we can bring to bear with the authorities, to insist upon every Board School having attached to it a good drill sergeant, and if possible, not only the miserable little pocket-handkerchief-sized pieces of land generally to be found outside our School Board institutions, but also a good gymnasium; some room where the boys and girls can be physically trained. I do not quite know whether many of my hearers have studied very deeply the system of general or universal service as it is called, which holds good now in all the great Empires of the world, and have compared its certain effect upon the population with that which our own military system has upon the people. I cannot help thinking, that any nation in the world

which will for two, three, four, or five generations submit to universal service, is bound at the end of that time to be physically a far finer race of people than a nation where that universal service does not exist. Now I am not dealing with this subject at all from a military point of view. I do not go into the question as to whether it is advisable for us to adopt a system of conscription, or general service, that is quite outside my argument; what I wish to emphasize is, that a nation like that of Germany or France, that adopts and maintains for two, three, or four generations a system of universal service, is bound to have at the end of that time a far finer race of men and women to be fathers and mothers of their future generations, and future soldiers, than a nation like ourselves, which neglects entirely the physical training of the great mass of its people. You have only to go to the great manufacturing centres of England, Manchester, Liverpool, Leeds, Sheffield, and to stand outside any great manufactory and see the men and women, boys and girls, coming out at the end of their day's work, in order to arrive at the same conclusion that I have often done, as I have watched them, and that they were most miserable specimens of humanity: and what is most to be deplored is, that they are going from bad to worse. At the present day, the people working in our mills and great manufactories throughout England are decidedly inferior as a race physically, to what they were in times past. As regards this want of physical training, it reacts very largely, as I have said, upon the strength of the people, and on the strength of the people depends, and must always depend, the strength of our soldiers, and therefore the efficiency of our Army. Unless we can draw upon a really healthy and strong people for our soldiers, we cannot have an efficient Army, and when the private soldier feels, as General Smith says, when he is asked to advance, that he has to meet a man who is his physical superior in strength, perhaps he will think twice before he does it; but if he knows that he himself possesses the muscular power which places him above the ordinary run of men in most countries in the world, he will not hesitate to grapple with his foe, and to face any amount of danger in order to do so. This question of physical training has a most serious bearing directly upon the Army, and I think you will all agree with me, that on the efficiency of our Army really depends I may say the safety of this country. I have no wish whatever to enter into any great disquisition as to what are the dangers to which we are exposed in this country. We have heard a great deal recently about this small Channel of ours giving us immunity from invasion; but I would ask you to remember, that the man who says England is safe from invasion, because we have the advantage of being separated from the Continent by a small narrow Channel, places himself at once in antagonism to the minds of some of the greatest men this world has ever produced, certainly the greatest soldiers. We have the authority of Napoleon, we have the authority of the late Duke of Wellington on our side, besides many other of our most distinguished General Officers in the past generation, such as Sir John Burgoyne, and you have at the present time a consensus of opinion, from every General Officer of any weight in this country, to say that this country can and may be invaded. When any gentleman makes a statement such as that which has recently been made public, that it is impossible to invade this country, because it would take a fleet of 480,000 tons in dimensions to carry over 100,000 men to these shores, I can only say, that although the gentleman who made it, I have no doubt made it in most perfect good faith, his informants have misled him in a most discreditable manner. There is a little book, I hope you will pardon me for alluding to it, as it is one with which I have had something to do, called "The Soldier's Pocket Book." The gentleman who made that statement, and those who gave him the information, I regret to say have not had the advantage of passing a competitive examination in "The Soldier's Pocket Book," because if they had, they would have found from its pages, that for what we call short voyages, and according to our system of transport, which affords our men far greater luxury than any foreign nation would think of providing, 100,000 men would require for a short voyage only 150,000 tons. That calculation is made, remember, on the authority of a paper drawn up in consultation between the War Office and the Admiralty some years ago. The very best men we had, consulted together, and drew up a scale of tonnage for the conveyance by sea of troops for long, medium, and short voyages; for short voyages they laid down, as well as I can remember,

at least I know it is so stated in "The Soldier's Pocket Book," one and a half tons for every man embarked. That does not include horses. But I would, however, go much further, basing my opinion upon the facts we collected regarding the numbers embarked by both Turks and Russians during the Russo-Turkish War of 1878. The Russians moved their men then by sea for much longer voyages than across the Channel between England and France, and only provided three quarters of a ton per man. Now I am certain of this, and I make the statement with a full sense of my responsibility in making it, that in the ports of France at this moment, and every day in the year, there is enough shipping to carry over 100,000 men to England. That I assert to be a fact; but if it be proved that I have made a mis-statement, I shall be the first to apologize and confess I have done so. But I make this statement after very careful study of the question, and I repeat again that in the ports of France at this moment there is enough shipping to transport to England 100,000 men, and that without any preparation at all. I hope you will pardon me for introducing here this small parenthesis into the discussion of a subject from which it is not entirely foreign, and which I am sure is a point of very great interest to most of those whom I address. I was very glad indeed to hear from Colonel Onslow such a very satisfactory statement regarding the recruits who join our Army at the present moment, and also to hear a medical Officer of the Guards speak so highly of the splendid body of men known as the Brigade of Foot Guards. I can only say whenever I have seen the Foot Guards lately, and notably last week on the Queen's Birthday, I never saw them looking better. I never saw a finer body of men of any nation in the world. To go from the Guards, which of course is our *corps d'élite*, and to refer to the line, which is after all the mainstay of the Army of England, I see as much of the line as most other Officers, and I can conscientiously corroborate everything said by Colonel Onslow as regards their present efficiency and physique when compared with the physique of men who joined the Army when I did. I do not think it is necessary for me to go into that very moot point of whether it would be possible to increase the rations of our men. That our men do not get enough to eat goes without saying, because as has been said by several of those who have spoken to-day, there is not a regiment in the Army in which the men do not largely supplement or considerably supplement the rations which they receive. I entirely endorse what Colonel Onslow has said, and believe it to be of very great importance, that we should give the soldier what is absolutely necessary for him. That we should not depend upon his deciding for himself in the morning as to whether he will eat a good or an indifferent dinner. We should insist upon his eating a good dinner every day in the year. A man may have lost half a crown at cards, and if he depends on his own means to supply food, he may have to go on short rations for days afterwards. To lose at cards is not an uncommon thing in a soldier, not an uncommon circumstance I dare say with many of us present. It would be, I think, an advisable thing, if we could manage it, to increase the rations of the British soldier. It might be easily done by excluding some of the very heavy bones which are now counted into the weight of the meat rations. I remember some years ago I made a very great effort myself on this subject to get rid of these large bones they counted as part of the meat rations, and my minute on the subject came back to me with a memorandum from the Officer of the War Office responsible for the supply of meat to the Army, stating that it was the custom of the trade to count in the hocks and knees of the animals, enormous bones as you may imagine, the knees and hocks of each beast killed for food. The War Office civilian overrode the recommendation of the soldier, and I had to content myself with a reply expressing astonishment that they did not also count in the horns and the hoofs, because it seemed to me they were all as useful to the soldier as food as the others could be. I think if you excluded those bones, and gave the soldier three-quarters of a pound of meat, and supplied him with those small rations which he buys for himself, he would be a very well fed man. I think as a rule he is a better fed man than those of most armies of the world, with the exception of the American Army, which is of course much better fed and paid than ours. To go back for one moment to my parenthesis. I was this very morning reading a most interesting and able article in the "Fortnightly." It is the first article in the Review. It is written anonymously, but I would beg all of you to read

it, because I am sure you will find in it an amount of information on the subject of the invasion of this country, which will be of the greatest possible interest at this particular time when that subject is so much discussed. Nothing more remains for me but to thank Colonel Onslow most sincerely for the very able, instructive, and most interesting lecture he has given us, and I am sure I echo the wishes and feelings and opinions of every one present when I beg him to accept our very best thanks.

Friday, June 8, 1888.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B., &c., &c., Adjutant-General to the Forces, in the Chair.

MILITARY CYCLING.

By Lieutenant-Colonel A. R. SAVILE, Professor of Tactics, Military Administration, and Law, Royal Military College, Sandhurst.

THE question of the employment of cycles for military purposes having recently been brought prominently into notice in this country, I have been invited by the Council of this Institution to deliver a lecture on "Military Cycling," and so throw some light upon a subject which is at present but little understood in military circles. The task, although congenial to me, is one requiring a certain amount of hardihood. I am well aware that this startling innovation is viewed by many military men with a feeling approaching to absolute aversion; but, on the other hand, I am greatly encouraged by the fact that numerous acknowledged authorities upon military matters —men whose opinions command respect—have recognized the possibility of deriving certain advantages from the use of cycles in the operations of war, and have declared themselves in favour of giving the machines and their riders a fair trial. I have also noticed that most of the bigoted opponents of the experiment are to be found amongst those who have absolutely no knowledge of cycling, and who, in point of fact, have not even studied the subject sufficiently to be able to concisely explain wherein lies the difference between a bicycle and a tricycle.

I venture to say that one of the most urgent requirements of modern warfare is the power to transport infantry rapidly from point to point in a theatre of war, and that a General who possesses this power, even on a small scale, will have an enormous advantage over an adversary who lacks it altogether, for he has an increased chance of being stronger at any place more or less remote which may suddenly become tactically important. This point has been fully argued out in several able lectures which have been delivered in this theatre, notably the paper read, in 1881, by Captain Lumley, who came before us with all the practical experience personally gained in a great campaign, and stated emphatically that during the winter of 1870–71, the Prussian Uhlans were daily either delayed, or forced to retire, or to give a wide berth to certain weakly occupied places, simply for want of the fire-power which the cavalry lacked in consequence of their movements being too rapid for any foot soldiers to keep pace with

them, but which even a handful of mounted infantry could have supplied. Consequently, on this occasion, I presume to lay down the utility of mobile infantry as an axiom, though I feel bound to mention that not long ago I met an Officer who has distinguished himself and risen to high rank in our Army, who told me that he could not conceive any possible circumstances under which mobile infantry would be useful. Such are the people who decry all innovations, and would stand still on the path of progress whilst others go by. It is well known that a novel suggestion is invariably criticized by two different parties; one asserts that the proposal will effect a revolution, and that everything must succumb to its influence; the other is equally certain that the whole idea is impracticable and ridiculous. Experience ultimately proves that the truth lies between the two statements; practical tests quickly reduce the innovation to its proper level, and then the adverse parties become reconciled. So, doubtless, will it be with military cycling. The authorities seem desirous to afford facilities for trials, in the course of which those advantages possessed by cycles may be practically demonstrated, and we shall learn how to make the most of such advantages; whilst, on the other hand, the failings and the weak points of both machines and riders will be clearly brought to light, and experience may show us how to overcome or minimize them.

Before proceeding further with my subject, I wish it to be distinctly understood that I have no desire in the slightest degree to advocate the claims of cycles as a means of transport for mobile infantry, to the exclusion or supersession of other means that have already been tested and found efficient. Chariots, horses, camels, Bianconi cars, carts, &c., have all been employed, and all have, under certain circumstances, been found useful. All that I claim for the cycle is that, in comparison with each of the above means of transport, it does, in some respects, possess certain definite advantages, which I shall presently bring to your notice; at the same time no one recognizes more clearly than myself that the cycle has certain equally obvious weak points. My great desire throughout this lecture is to throw as clear a light upon the objections to the military employment of cycles as I do upon the arguments in their favour.

I think it will be useful first to place before you a summary of what has already been accomplished with regard to military cycling in Continental armies, and to show you in what respects we in England, though taking up the subject at a later date than any other Power, have already given to military cyclists a more prominent position in our armed strength than has elsewhere been accorded to them.

Italy seems to be the first country in which military cycling was practised. During the manœuvres of 1875, at Somma, a regular service of cyclists was established for correspondence between the Quartermaster-General and Chiefs of Battalions. The experiment was continued in following years, and it was found that the new breed of orderlies could cover 20 kilometres in an hour, and that for several consecutive hours. The Italian military papers have consistently advocated this use of cyclists, urging that the machines

require no care or food, and that they can go not only wherever cavalry can go, but even wherever infantry can pass, for a man can lift his machine over any obstacle that he can climb himself. At the present time every Italian regiment of infantry and bersaglieri possesses four or five bicycles, on which soldiers who wish it are taught to ride by the gymnastic instructor, and those men who are proficient riders are employed as regimental orderlies. I believe it is a fact that the Italian Government is now negotiating with one of the great Coventry firms for a supply of safety bicycles of the latest pattern.

In Austria, in 1884, by direction of the Minister of War, a party of cyclists from the Military Academy performed a five days' march, carrying field kit; the longest distance covered in a day was 110 kilometres. The experiment appears to have been satisfactory, for in the Austrian manœuvres of 1885, cyclists were employed on a large scale as messengers. Distances up to 160 kilometres were ridden in a day, and the results were much commented on in military circles. I am informed that the nucleus of a body of cyclists has been formed at the Military Academy at the Wiener Neustadt, and that its expansion is contemplated. There is also some talk of procuring machines from Coventry.

In Germany, also, experiments have been made, and cyclist detachments have been put through courses of training in scouting and signalling at Frankfort and Strasburg. In January, 1886, the German military authorities purchased a number of bicycles and tricycles from a German firm for distribution among the fortresses of Cologne, Strasburg, Konigsberg, and Posen; these machines are used by orderlies to carry messages to the detached forts, and it has been proposed to use them to maintain communication between the fractions of an outpost force, and to extend their employment in other directions.

The Swiss papers, particularly the "Gazette de Lausanne," have recently pointed out very forcibly the valuable services rendered by cyclists at the manœuvres of the Federal Divisions in 1887, showing how their employment had spared endless fatigue to horses and to troopers who had formerly been at work all day carrying messages and reports.

It was in the course of a military lecture at Saint Cyr, in 1878, that one of the professors first drew attention in France to the utility of cycles for certain military purposes, and pointed to the success of the experiments made in Italy. The matter was taken up rather slowly, but now the novelty has quite worn off in France, and military cycling is at present by no means regarded as a fanciful idea. For years past cyclists have been employed as messengers between the French frontier fortresses, and in 1886 they were very successfully used by General Cornat as despatch-bearers during the manœuvres of the 18th Army Corps. As a rule, the cyclists carried seven or eight despatches daily, giving an average of 80 kilometres a day for eight consecutive days. The Officers of the General Staff were particularly struck with the freshness of the bicyclists after a run of 80 or 90 kilometres, and it was found that even on cross-country footpaths

a very fair rate of speed was maintained. On one occasion only were the cyclists unable to follow the General on horseback, but they made a *détour* so rapidly as to reach the destination fixed upon before the General arrived there. During the principal engagements, General Cornat entrusted all his orders to cyclists, and also used them for reconnoitring purposes. The General, in his report to the Minister of War, stated that throughout the operations he had not employed a single horseman as an orderly, and that his messages had been carried three times as rapidly as usual. In 1887, on the mobilization of the 9th and 17th Corps, special inducements were offered to those reservists who were good cycle-riders to turn out with their machines. Large numbers applied to do so, and only the best men were chosen. Ten cyclists were attached to the staff of each army corps, five to each Divisional staff, and two to each brigade staff. The results were very satisfactory. The day speed averaged 15 to 25 kilometres an hour, the night speed 10 kilometres an hour. Journeys of 100 kilometres in the day were frequently performed, but this was considered about the maximum that a rider could accomplish day after day. The safety bicycle was found to be a better all-round machine for military purposes than the ordinary bicycle. The French military authorities have decided that cycling competitions amongst reservists shall take place at Rouen and Montpellier for the selection of riders to be employed this year at the manœuvres of the 3rd and 16th Corps.

So far as I can ascertain, the first person in England to direct attention to the possibility of utilizing cyclists for military purposes was Colonel (now Lieutenant-General) J. Sprot, who, in 1881, was commanding the Brigade Depôt at Kingston-on-Thames, and who, in April of that year, in some letters which appeared in the "Cyclist," signed "C. O.," suggested that men mounted on bicycles might with advantage be employed as orderlies, and that tricyclists could efficiently perform the duties which fall to the lot of mounted infantry. No steps were, however, taken at the time to test the value of the suggestions. Next followed the Hon. R. G. Molyneux, late Royal Dragoons, and now Major in the Duke of Lancaster's Own Regiment of Yeomanry Cavalry, who, in a letter in the "Volunteer Service Gazette" of May 20th, 1882, noticed the assembly at the Hampton Court Meet of 2,000 young and intelligent men belonging to bicycle and tricycle clubs from all parts of England. He argued that a cyclist could go double the distance in a day that a horseman can accomplish, that he travels faster and noiselessly, that his mount does not eat; and, then, after stating that the army for home defence is almost devoid of cavalry, he came to the conclusion that such men would be useful as scouts, outposts, and orderlies. In the same paper, the next week, appeared a letter from Lord Elcho—who, as the editor remarks in the same issue, has ever had the keenest instinct for discerning what the civilian branch of the Army can and cannot do—from which I extract the following:—"I hope the idea of turning our army of cyclists to purposes of defence will not be lost sight of, and that some patriotic, energetic, and influential member of their many clubs will take this

matter up. They are already organized in clubs, which would form the nuclei of cyclist volunteer corps, and they each appear to have a club-dress or uniform. They also appear to have Officers of different grades: all, then, that is wanting is a rifle slung across their backs, cartridge-pouches, and well-defined duties. I am greatly mistaken if, within twelve months from the present time, we do not hear of the inspection of a cyclist volunteer corps." The subject was continued in the "Volunteer Service Gazette;" it received warm support from the editor of that paper, and numerous letters and articles bearing upon military cycling appeared during the summer of 1882. In November, 1882, a copy of a letter written to the General Officer Commanding the Home District, and a list of about 100 names of gentlemen wishing to join a Cyclist Corps appeared in the "Volunteer Service Gazette." As no results followed, I can only imagine that the proposal did not at that time find favour with the military authorities.

The credit of the first actual employment of military cyclists in England is due to Colonel Tamplin, 1st V.B. Royal Sussex Regiment, who, at the Easter Manœuvres of 1885, made a very successful experiment with bicyclists as scouts. I hear from the Adjutant of the battalion that ever since that time cyclist scouts have been employed with advantage whenever field operations have been practised.

It was not, however, until Easter, 1887, that cyclists came at all prominently under public notice in England. Colonel Stracey, Scots Guards, who was in command of the Dover Marching Column, finding himself short of cavalry, conceived the bold idea of using cyclists as scouts on the flanks of his line of march, and the fact was made known in the newspapers. I chanced to see the notice, and having been for years an ardent follower of the sport, and also, as a Professor of Tactics, feeling interested in the tactical aspect of the experiment, I wrote to Colonel Stracey offering to command his Cyclist Corps, and my services were accepted. Thus my connection with military cycling was purely accidental, and I have no claim to pose as one of the originators of the novelty. I mention this because I wish to make it clear that any opinions I may put forward in the course of this lecture are not founded upon preconceived and theoretical ideas, but are derived from the practical knowledge of the possibilities of military cycling acquired from the experiences of the last fifteen months; the subject having been approached by me in the first instance not at all as a prejudiced enthusiast, but in reality as a perfectly disinterested critic.

The Cyclist Corps of Easter, 1887, was quite a scratch body; some of the men were volunteers, others were civilians with no military knowledge at all. I was astonished to find how easily these civilian cyclists fell into soldierlike ways, and what aptitude for reconnoitring they displayed. I am convinced that bicycle riding tends to make men ready of resource, quick to act in unforeseen emergencies, sharpens the intellect, and gives presence of mind in unexpected danger. Every cyclist of any standing can read a map, and has the bump of locality abnormally developed. These qualities go far in

the composition of a good scout. I particularly noticed that many principles of reconnoitring, which I find difficult to drive into the heads of the cadets at Sandhurst, seemed to come quite naturally to these amateur scouts, who certainly could not have defined the word "Reconnaissance." On the first day of the manœuvres, the Cyclist Corps was separately employed in a reconnaissance towards Faversham. I allude to this because it has been the only occasion on which cyclists have been required to do cross-country work conveying machines, and right well they did it. Whilst the main body, composed chiefly of tricyclists, moved along the centre road, the flankers on bicycles scoured the country from 8 to 10 miles on each side, moving through the Whitstable marshes on the right, and along bye-lanes and foot-paths, through hop-pole plantations, across ploughed fields, and over locked gates on the left flank. No orders were given by me to go by roads, or to go across country; each patrol was told the places it was to visit and the final rendezvous, and its commander took what he considered the best route, sometimes riding and sometimes wheeling the machines and lifting them over obstacles, but always keeping touch with the parties on the right and left. On that afternoon I sent out two picked men on a special mission, they rode 50 miles in just under five hours, though much of the way was in very bad order, and about two-thirds of it in the face of a fierce N.E. wind. On the next day the cyclists acted as scouts for the marching column on a front of about 30 miles from Ashford to Ramsgate, and I have every reason to believe that Colonel Stracey was satisfied with the manner in which this duty was performed. On Easter Monday the corps, having previously had one hour's drill on the review ground, marched past H.R.H. the Commander-in-Chief in very fair style. The official verdict of the War Office authorities, as regards the cyclists in 1887, was "very satisfactory."

The success of this experiment quickly led to the formation, by authority, of several bodies of military cyclists.

First. A Cyclist Corps, the 26th Middlesex, has been formed by direction of the Secretary of State for War, under command of Major Percy Hewitt, late Carabineers, with an authorized establishment of 120 of all ranks. This corps only came into existence on April 1st, but a detachment under command of Captain Fletcher Vane, late Scots Guards, took part in the Easter manœuvres this year, and distinguished itself by its smartness, riding ability, and general efficiency.

Secondly. A scheme for training soldiers of the regular forces as cyclists is in progress at Aldershot under the supervision of Major G. M. Fox, Assistant Inspector of Gymnasia. Machines of various types have been purchased by the Government from Singer and Co., of Coventry, and about twenty men are now being put through a regular course of instruction.

Thirdly. Volunteer battalions have received permission to organize cyclist sections within their establishments; the strength to be 1 Officer, 2 non-commissioned officers, 12 to 20 privates, and 1 bugler. A large number of battalions have already availed themselves of this per-

mission—no less than thirty-two applications from battalions to send representatives to the last Easter cyclist manœuvres were received—and it is probable that during the present season most of these sections will be recruited up to full strength. In August, 1887, a series of instructions concerning the formation of the sections, and for the guidance of the Officers commanding them, were issued by the War Office. These instructions deal with the selection of the men, their arms, dress, training, and duties; they also indicate very clearly the intention of the authorities to employ the cyclists not merely as messengers, but as a fighting force to perform such duties as fall to the lot of "mounted infantry."

It is in this respect that we, even in the initial organization of our bodies of military cyclists, have enlarged upon the functions of the cyclists who in Continental armies have long been employed for duties of minor importance. Whether this bold step is fully justified or not is, I maintain, a question that no one has yet acquired a sufficient knowledge of the military capabilities of the cycle and its rider to be able to answer with any degree of certainty, and I submit that it is manifestly unfair to pass sweeping judgments upon the performances of civilians enlisted in one week and called upon in the very next week to execute the whole of the very difficult duties of mobile infantry during field manœuvres. Experience in handling cyclists as a fighting force must be acquired by the commanders before the merits of the men can be pronounced upon.

Last April, I, with no rules but those of common sense for my guidance—for no one had ever been in a similar position before—found myself commanding cyclists engaged in offensive and defensive operations. Surely, if failings were observed, they should primarily be attributed to the ignorance of the commander, and not to inherent weaknesses on the part of cyclists as a body.

The cycle is now recognized by our military authorities as one of the means of transport for that mobile infantry which may possibly in the future supply the fire-power so long needed by cavalry when employed far in advance of the marching columns of an army.

It is naturally not my intention to enter at all into that vexed question as to whether cavalry should, or can, possess sufficient fire-power to render itself independent of infantry under all circumstances, or, in other words, whether it is possible that the same men can be efficient cavalry and efficient infantry; but I must draw attention to the fact that the cavalry which the volunteer cyclists would be chiefly required to work with and support would be the cavalry of our auxiliary forces, and it has been stated over and over again in this theatre in the most unmistakable terms, and by those who ought to know, that the yeomanry wish to be cavalry and cavalry only. Whether, even with the best intentions in the world, the yeomanry would be able during their limited training to learn the functions of both infantry and cavalry is a very doubtful point.

Immediately military cycling was taken up by the volunteers, the question arose—What type of cycle shall be selected? It soon became apparent that none of the machines in the market quite fulfilled all

the requirements of a military cycle; the very high prices charged by the leading makers for a thoroughly reliable machine which would stand the strain and wear and tear of military work constituted another difficulty; numerous questions also arose as to uniform, equipment, and training. In order to solve these questions, and, if possible, to provide the volunteers with efficient cycles at a cheap rate, a War Office Committee, composed partly of Officers of the regular and auxiliary forces, and partly of well-known civilian cyclists, was appointed, under my presidency, in December, 1887, to inquire into and report upon the following subjects, viz.:—

(*a.*) To draw up precise specifications of types of cycles suitable for military requirements.

(*b.*) To ascertain where such cycles can best be manufactured, and at what cost.

(*c.*) To consider the clothing, arms, equipment, accoutrements, and kit of a volunteer cyclist, and the means for carrying the same in the field.

(*d.*) To consider the course of training of a volunteer cyclist.

(*e.*) To consider the conditions of efficiency of a volunteer cyclist.

The work of this Committee has been somewhat delayed by various circumstances beyond its control, but it has now made its final report, and it may be hoped that its recommendations, if approved and carried into effect, may tend to facilitate and develop the formation of cyclist sections in volunteer battalions.

The next event in the history of military cycling was the manœuvres of last Easter, when the cyclist sections of volunteer battalions were assembled by direction of the War Office under my command. All the counties in the south-east of England were well represented, and detachments also came all the way from Norfolk, Durham, Lancashire, Gloucestershire, and Dorset. In my original programme some fairly long marches were included, but as the main object of the manœuvres was not so much to test the marching power of cyclists—that being already tolerably well known—as to ascertain whether they could be used as a fighting force, and as during March the weather was so bad that it was practically impossible for men engaged in business to get that amount of riding that would put them in training for what would be considered long marches from a cyclist point of view—I mean marches of 50 to 100 miles or more—and also as the roads to be traversed were certainly the worst and most hilly in the south of England, I obtained, some time before the manœuvres, the sanction of the War Office to any alteration in my plans that I might consider advisable under the circumstances. I allude to this because I know an idea was prevalent after the manœuvres that the cyclists were unable to perform the two marches of 60 miles a day originally intended for Good Friday and Saturday. This was not so. The distances might quite well have been ridden, but the conditions of weather and roads were such that leaving Guildford at 7.20 A.M. on Good Friday I could not be sure of reaching early enough the point on Salisbury Plain, 58 miles distant, where an engagement with the Wilts Volunteers, under Lord Pembroke, had been arranged to take

place at an hour which had been fixed upon the assumption of ordinary conditions. I consequently only marched the men 33 miles, and entrained them the remainder of the distance. The roads on Salisbury Plain were so bad that it was often preferable to ride over the downs; and the blinding rain, combined with a very strong head wind, made the march exceedingly severe. The experience gained was, however, sufficient to show that even under the very worst possible conditions cyclists could march as far, or perhaps farther, than any other arm.

On the following day the cyclists were told off in two bodies to act against each other offensively and defensively along the road between Salisbury and Winchester. One body, representing a rear-guard, took up defensive positions where the ground offered favourable opportunities, and awaited attack. Nothing of the kind had ever been done before with cyclists, so the operations were at first quite of a tentative or experimental nature, but before the day was over both Officers and men appeared to fall into the work very easily, and I am sure that many valuable lessons of minor tactics were learnt. It soon became apparent that a marked advantage rested with defenders having cycles if opposed only by cyclists. Good defensive positions, generally at the top of a long slope, and invariably with a downward slope close in rear, were selected by the rear-guard commander; the assailants reconnoitred these positions with their advanced scouts, who always managed to avoid falling into ambushes, and when the main body came under fire it dismounted, assumed the attack formation, and advanced. The defenders never allowed the attacking party to close, but retired to their machines as soon as the position became unsafe, mounted, and were quickly out of sight. The same tactics were repeated at the next favourable spot. The assailants were never able to pursue quickly, for they had to go back over all the ground they had skirmished across in order to fetch their machines, and then either ride slowly or push up the long slope again. As this experience was far more useful than mere marching, a great part of the day was devoted to tactical exercises, and again the force only rode 33 miles. Attention will probably now be turned to means for lessening the disadvantages I have mentioned. In the first place, if the cyclists were co-operating with cavalry the difficulty would be almost entirely removed, for the cavalry would take up the pursuit at once, and the cyclists could easily come up in time to force without delay the next position taken up by the retreating party. Or, if some means were found of coupling bicycles together, some men could be left to push them on nearer to the fighting line at the conclusion of the action. Or, if the men are mounted on multicycles carrying ten or twelve riders, two men could push each unloaded machine forward. I have very little doubt that some remedy will soon be found, and in criticizing the present weak points it is only fair to remember that military cycling is now quite in its infancy and in the experimental stage.

On Easter Sunday, as no fighting was to take place, the day was devoted to easy marching at a steady pace, and distances from 48 to 74 miles were covered by the various detachments.

On the whole, I think these manœuvres taught many very useful lessons, and it is evident that the volunteer cyclists must avail themselves of all similar opportunities in order that their true functions in military operations may be practically ascertained and defined. I have frequently been asked why I selected for these manœuvres the most unfavourable area for cycling work that could be found in the South of England; I am inclined, however, to think that the reason must be obvious to those who are present to-day: it was simply because, knowing quite well what cyclists could do under favourable conditions, I was anxious to discover as soon as possible what they were capable of doing when circumstances were adverse.

The next question which presents itself for consideration is—What type of machine is most suitable for a cyclist soldier? There are five general types to choose from:—

(1.) The ordinary bicycle.
(2.) The rear-driving safety bicycle.
(3.) The single tricycle.
(4.) The tandem tricycle, carrying two riders.
(5.) Multicycles, carrying more than two riders.

The ordinary bicycle, though an excellent touring machine, is not well adapted for military purposes. Compared with the safety bicycle, the height is greater and the rider more conspicuous; the weight is high up and almost over the centre of the front wheel, so when the machine strikes an obstacle there is a tendency to throw the rider forward; difficulties arise as regards carrying arms, ammunition, and kit; the labour of mounting and dismounting is greater; and I am not aware of any compensating advantages.

The safety bicycle appears from all points of view to be the best all-round machine. It has two equal-sized wheels, the rear wheel being driven by a chain. The rider sits above and between the two wheels, and his feet are raised only a few inches from the ground. The machine runs easily over considerable obstacles, and is practically safe down any hill. All that a soldier wants to carry on service can be easily packed on the machine. Its speed, acquired by gearing, is quite as great as that of the ordinary bicycle. The same machine can be ridden both by a tall and a short man. For convenience of mounting, dismounting, stowing for transport, and handling, the safety bicycle has no equal.

All tricycles possess the advantage of stable equilibrium; the rider can halt without dismounting, and can turn about easily. The single tricycle is therefore, in some respects, suitable for use by an Officer. Being, however, a three-track machine, its progress on rough and rutty roads is much impeded, and it could only be taken off roads with much difficulty.

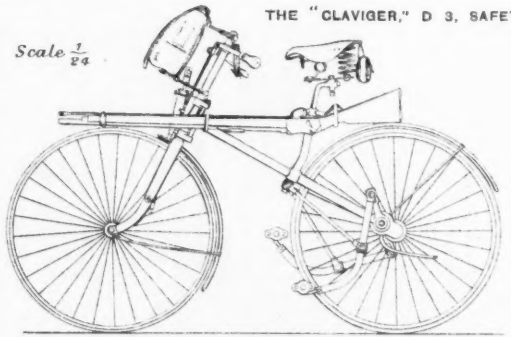
The tandem tricycle is a fast machine, and if one rider is dismounted for any duty, the other can ride the machine along and keep close at hand. It can carry a large amount of baggage.

Multicycles are still in their infancy. It has been suggested that this type of cycle can be adapted for the transport of machine-guns,

Journal R.U.S. Institution Vol. XXXII.

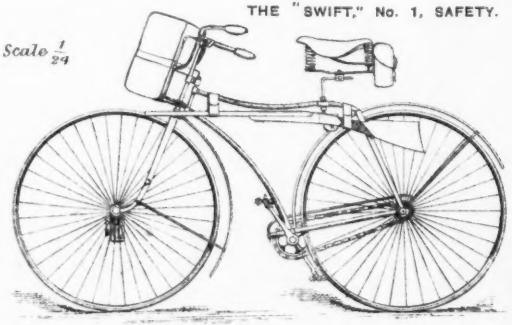
THE "CLAVIGER," D 3, SAFETY.

Scale $\frac{1}{24}$



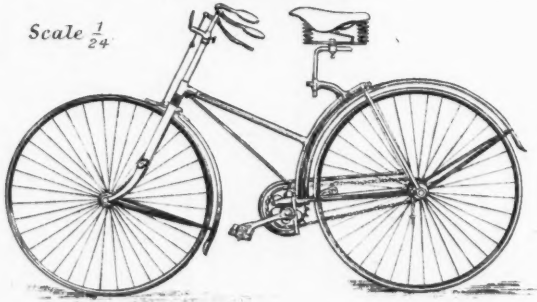
THE "SWIFT," No. 1, SAFETY.

Scale $\frac{1}{24}$

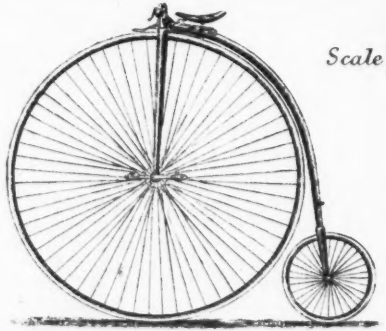


THE "SINGER" SAFETY.

Scale $\frac{1}{24}$



Scale $\frac{1}{38}$



Harrison & Sons, Lith. St Martins Lane, W.C.

field engineering materials, field telegraph equipment, or reserve ammunition. Machines designed for the two first of these objects were brought into the field last Easter; they were, however, of experimental build, and had been very hastily constructed; both broke down at a very early stage of the operations, being unable to withstand the strain of their heavy loads on very rough and hilly roads. This, in my opinion, by no means proves that cycles cannot be applied to such uses. I think that when a manufacturer is found combining mechanical ingenuity with a thorough knowledge of what is required from the military point of view the difficulties will be overcome. That cycles capable of bearing great weights can be constructed is shown by the "Carrier" machines so common in large towns. Multicycles carrying ten or twelve riders with their arms, kits, and a large quantity of ammunition, have been made by Singer & Co., of Coventry. A machine of this description was thoroughly tested at Aldershot last year, and was so favourably reported on that the Government has purchased one for further experiments. For sending forward small parties of marksmen long distances in compact bodies, such machines offer definite advantages, particularly in the case of cyclists of the regular forces; but as in the volunteer force each cyclist has to provide a machine at his own cost for his individual use, such machines are obviously unsuitable.

I believe I am right in saying that practical cyclists are unanimously agreed that the rear-driving safety bicycle is the military cycle of the future—at any rate so far as the volunteers are concerned.

The speed which can be attained by cyclists is the next point that I wish to draw attention to. It did not require much experience to discover the fact that the speed of a marching body of cyclists can no more be compared to the pace of a well-trained man riding singly, than can the rate of progress of a troop of cavalry scouting across country be compared to the pace of a steeplechase; still, as one of the best recognized functions of a cyclist is his employment singly as a messenger, I think it will be both useful and interesting to lay before you some of the performances on various types of machines on roads. These road records—marvellous as they appear—are established beyond a shadow of a doubt; they have all been performed under the auspices of the National Cyclists' Union, of which Lord Bury is President, and are vouched for by that body. A rider proposing to establish a record on the road gives due notice of his intention and his route; competent timekeepers, holding Kew-certificated watches, are appointed; an elaborate system of checks is provided, so that the exact line of the ride is ensured; and any portion of road without milestones is measured by chain. The rider is not allowed to select a good stretch of road and ride up and down it, for, however long the ride, no portion of the route may be ridden over more than twice. A favourite 50-mile course is from the 30th to the 80th milestone on the Great North Road, and for 100 miles the same course and return. The 24 hours' route is often from Hitchin, through Peterborough, to King's Lynn, and then round by Norwich to Bedford. The following are some of the most important records:—

	50 miles.	100 miles.	24 hours.
Bicycle ..	2 hr. 47 min. 36 sec.	6 hr. 39 min. 5 sec.	295 miles.
Tricycle..	3 „ 9 „ 15 „	7 „ 11 „ 6 „	264 „
Tandem..	2 „ 46 „ 3 „	6 „ 57 „ 32 „	298½ „

Land's End to John O'Groat's, 876 miles..... { Bicycle .. 5 dys. 1 hr. 45 mins. Tricycle.. 5 „ 10 „

The bicycle records for 50 miles and for 24 hours were made on rear-driving safety bicycles.

To show that there would be no lack of fast riders for despatch bearing in the United Kingdom, I may mention that I have a list of the names of some hundreds of riders who have accomplished over 200 miles in 24 hours. In this connection it is worthy of notice that just before the Easter manœuvres I received a letter from the Honorary Secretary of the North Road Cycling Club, offering me the services of "six fast riders each prepared to ride from 100 to 200 miles in the 24 hours;" and, to show that this was no idle boast on the part of the Club, I can tell you that in the 24 hours' road ride carried out by its members on September 3rd, 1887, the winner rode 270 miles on a safety bicycle; another man rode 100 miles in 7 hours 52 minutes on an ordinary bicycle, and covered 237¼ miles in the 24 hours; the leading tricycle rider covered 264 miles, and many others accomplished over 200 miles. There is abundance of incontestable proof that the above distances are not exaggerated. I need hardly say that I was unable to accept the services of the North Road riders at Easter, for the manœuvres were naturally confined to volunteers armed and in uniform. Possibly, however, it may at some future day be a useful thing to have in our country so many athletic young men capable of performing such wonderful feats, and who may be depended upon gladly to use their strength in the service of their country if required to do so.

If soldier cyclists are moving in a body, their pace, like that of any other armed force, slows down and becomes that of the weakest man; it should be estimated at not more than 6 to 8 miles an hour, according to the conditions of road and weather.

For the proper performance of the military duties which will presently be suggested as suitable for cyclists, it is necessary to establish two points concerning speed, viz.:—(1) That under any circumstances cyclists can move farther in a given time, and faster than ordinary infantry; (2) That cyclists can keep up with cavalry in a day's march along roads. As to the first point—suppose the roads to be covered with snow, that being their worst aspect as regards cycling. In such a case, a column of infantry would probably not march more than 2 miles an hour including halts, and I can safely assert that a small body of cyclists moving in open order would exceed this pace even if the men had to push their machines all the way; but, even on the worst possible roads, short bits practicable for riding will be found, and on these the cyclists will gain vastly. I can hardly conceive any circumstances that would prevent a body of soldier cyclists from covering 40 to 50 miles in the hours

usually allotted to a day's march; so, compared with infantry, the marching power may be estimated at about three times greater, both in pace and distance. If all the circumstances are favourable, the relative gain of cyclists would be much greater than that of men either on foot or horseback, and 100 miles would not be a difficult day's march for a body of cyclists in proper training. Next, as to the second point. It may be within the knowledge of some here to-day that several of our cavalry regiments—5th Lancers, 13th Hussars, and 14th Hussars—have lately made experimental "distance rides," and have accomplished 40 to 70 miles in a day, with parties of from four to eight men, on such roads as Colchester—Norwich, Brighton—Windsor, Shorncliffe—Woolwich, and Shorncliffe—Brighton. I think no one will deny that on such roads a similarly picked and equally small party of cyclists could easily have performed each of the cavalry marches and back again in a day. The work done on the first two days of the Easter manœuvres showed that even under adverse circumstances infantry can by means of cycles be transported, in a condition to fight, over distances at least as great as could be traversed in the same time under any circumstances by any other mounted arm. In fact, on the ordinary roads of the United Kingdom or the Continent, it is certain that the speed of cyclists is sufficient for all military purposes. It is, however, equally apparent that in some uncivilized countries cycles would be absolutely useless, and it would be absurd in such cases to attach any cyclists to the expeditionary force. Yet, obviously, this is no argument against the general military use of cycles, for cases will occur to you of British operations in countries where even cavalry and field artillery could not be employed; but no one would venture on that account to question the value of these arms.

A weak point as regards the efficiency of our volunteer cyclists results from the fact that the men do not, as a rule, ride much in the winter, and consequently their riding power in the early spring is not to be compared with what it becomes in the summer and autumn. Manifestly, a soldier to be efficient at all must be efficient all the year round, and it is a matter of the highest importance that the commanders of the cyclist sections of volunteer battalions should exercise their men in mounted work throughout the winter, and also encourage them to keep up their riding privately, so that all may be sound in wind and limb whenever their services are required. Amongst cyclists of the regular forces this difficulty disappears, for the men being always under command can easily be kept in training.

Next comes the consideration of what points of advantage are possessed by cycles as a means of transport for mobile infantry: (1) Foremost amongst these must be mentioned the obvious fact that the cycle requires neither forage nor water. The independence and the freedom of action acquired thereby must be apparent to all who have had to arrange for the provision of these necessaries for animals used for transport. The cyclist soldier carries in a pocket oil-can all the refreshment required by his mount during a journey of hundreds of miles. (2) When cyclists are in action no men need be left behind

to hold the mounts; every man can be placed in the fighting line. Colonel Hallam Parr, in his "Training and Instruction of Mounted Infantry," says, "Few who have commanded mounted infantry in action but have turned envious eyes to their horse-holders, and devised schemes for getting more of them into the fighting-line." Yet, comparing cyclists in this respect with mounted infantry provided with horses, I have already drawn attention to the fact that cyclists lose much fighting power from the difficulty of keeping the machines near the men who are tactically engaged. It is not that a safety bicycle cannot be wheeled or carried across country, but even if half the force were left behind to bring up machines, it is not easy for a man to wheel two safety bicycles except on fairly smooth ground. (3) The machines of the dismounted men, when laid on the ground, are quite invisible at very short distances; the enemy would not know their position, and they offer no target for fire. I noticed in the remarks of the chief umpire upon a field day lately held at Aldershot, that the exposure to fire of the horses of the mounted infantry was the subject of comment. (4) I think it must be admitted that cycles are less conspicuous on the road and more silent on the march than any other kind of transport. The dust raised by cycles is very slight compared to that caused by animals. The tramp of horses carrying scouts or messengers can, especially at night, be heard at great distances, whereas the cycle is absolutely noiseless. In an excellent paper on "The Use of the Cycle for Military Purposes," contributed by Mr. Lacy Hillier to "Longman's Magazine" of July, 1887, the distance ride performed by a small party of the 13th Hussars is noticed thus:—"The 137 miles covered by the 13th Hussars in 68½ hours would be very easily accomplished by a quartet of picked cyclists in 14 hours; whilst, if secrecy was required, the journey could be accomplished with great ease in two nights; the silent wheels would pass undetected where four mounted men could hardly hope to go unnoticed." (5) A cycle requires but little daily care or protection compared to the attention that must be given to any live animal in order to keep it in efficient condition. (6) Military cycles would be made to gauge, and be interchangeable throughout; two disabled machines could be easily turned into one serviceable one, and the vital parts are few, small, and easily carried. (7) Cycles can be very easily transported by rail; a large number of machines can be quickly packed in any kind of van, truck, or carriage, without the aid of a platform.

The cost of efficient safety bicycles for military purposes ought not to exceed about 12*l.* each, if a number of machines are built upon one order. I do not, however, wish to lay any stress upon the relative cost of cycles and of other means of transport for mounted infantry. Possibly a cycle may cost less than a horse, pony, camel, or even a donkey, but do not let us have a cheap article merely because it is cheap. If the cycle be found to possess certain merits, then by all means let us have some cycles, and let us apply them to such uses for which their fitness can be proved; but if any other kind of mount be superior to the cycle from all points of view, then let the cycle be discarded, however cheap it may be.

It has been urged as an argument in favour of a cyclist corps that there is no fear of its endeavouring to imitate the tactical functions of cavalry, and that the men will always remain infantry soldiers provided with means of moving quickly. I believe this to be strictly true; the simple reason being that it is physically impossible for cyclists to fight mounted, even if they were fools enough to wish to do so.

A frequent objection to the employment of the cycle is the assertion that it is a fair-weather machine, and that bad weather, causing bad roads, would prove fatal to its efficiency. I feel bound to point out that this is only partially true. Mr. Lacy Hillier—than whom no more competent judge of the capabilities of the cycle exists—enters into this subject in the article I have already alluded to, and shows that though the cycle may be more markedly affected by adverse circumstances, that merely constitutes an admission of its higher average of pace under normal conditions. We all know how terribly every arm and every means of transport is impeded by bad roads, and the delay experienced by cyclists would in reality never be more than proportionate. Colonel v. Schellendorf states that an infantry Division under favourable conditions performs its march of 14 miles in six hours, but in bad weather and on heavy roads would take from nine to fourteen hours to accomplish the same distance. A body of cyclists might well march 14 miles in one and a half hours, but I can hardly imagine any circumstances so adverse as to cause it to take three and a half hours over that distance, yet this is only in the exact proportion of the delayed march of the Division.

It is manifestly unnecessary to enter now into the functions of mounted infantry; I need only mention such of those functions as appear to be within the power of cyclists to perform, and briefly state the reasons for the assignment in each case.

The speed and the staying power of cyclists seem to qualify them for employment in all the duties pertaining to messengers, orderlies, or despatch bearers both in peace and war. The establishment of relay posts of cyclists on any long line on which messages have to be sent would ensure very rapid transmission, and would liberate troopers for other duties.

Their speed and noiseless progress fit them as a means of communication between the fractions of an outpost force both by day and night, and between the outposts and the main body.

The same qualifications, and the inconspicuous character of the cycle render cyclists eligible as scouts or reconnoitrers in any cultivated and enclosed country where the operations are mainly confined to the roads. Cyclists, being infantry, can dismount and go wherever infantry can go; and, for the same reason, a small body of cyclists has nothing to fear from an equal or even slightly superior party of hostile cavalry which it might encounter similarly engaged in scouting.

Cyclists appear to be well qualified to act as escorts for convoys; the men would not be tempted to mount upon the carts, the convoy could move faster than if the escort were composed of infantry,

and cyclists could reconnoitre widely to the front or flanks. In many cases a cyclist escort for guns would be perfectly efficient; all the duties of an infantry escort can of course be performed by it, and if the ground admits of the guns being moved quickly, such ground will also admit of the cyclists keeping pace with the guns when changing position.

The power of carrying entrenching tools or materials for demolitions, added to speed and silence, enables a body of cyclists to make sudden raids for offensive purposes; and the men can equally be employed to reconnoitre and discover the resources of an area of country, to make surveys, or to verify and correct local maps.

The power possessed by each man of carrying a rifle, a large quantity of ammunition, and the service kit, together with the freedom derived from the fact that no additional transport need be provided, qualifies cyclists to act in co-operation with the cavalry screen in the attack and defence of points which are locally important. It is very desirable for the proper performance of this duty that the ranks of the cyclists should include as many marksmen as possible, and every effort to attain this standard should be made. That the cyclists will be able to reach on their machines those points that are tactically or strategically important hardly requires proof. In a civilized country it is the existence of a road—generally a main road—combined with some feature, such as a bridge, ford, railway junction, &c., that constitutes the main reason for the desire to hold or to seize any position. On arriving at the place where their services are required, the cyclist soldiers merely drop their machines and act simply as infantry.

Should infantry not be required actually with the cavalry screen, cyclists would still be very valuable to form connecting links or rallying points along the roads between the cavalry scouting parties and the heads of the advancing guards marching in rear.

In the case of a force, detached or otherwise, and weakly provided, or not provided with cavalry, cyclists would in most cases be able to perform the scouting duties for the information and protection of the force. Probably they might not be able under all circumstances to carry out these duties as efficiently as cavalry, but I think it must be granted that they would reconnoitre more widely and rapidly than unmounted infantry.

In conclusion, I would say that I hope the fact of my bringing this subject to your notice may not be misconstrued. I am not the originator of military cycling, and I do not extol cycles at the expense of other means of mounting mobile infantry. I have endeavoured to treat the subject impartially, and I hope I have succeeded in not giving offence to the partisans of any particular description of mount. As the result of a good many years' practical experience of cycling, I am inclined to believe that the cycle does possess certain uses for military purposes, but whether these uses really do exist, and whether they are sufficient to justify a trial, are points that must be left to those in authority to decide. Adverse criticism upon what has been done and what is now being done by cyclist soldiers must, I think, to a certain extent be disarmed by the present immature stage of the

experiment: civilian cyclists would indeed be marvels if they could spring into existence as fully developed soldiers, and, without training or experience, efficiently perform the numerous and difficult duties of mobile infantry.

Major-General DAVIS: I should like to know whether the lecturer really means that cycles can go across ploughed fields. It astonished me very much to hear it. The country he talks of at Faversham is sound land, and chalk soil, but I cannot believe that they ever could get across stiff ploughed fields, particularly after wet weather.

Colonel SAVILE: You would not be able to ride a bicycle across ploughed fields, but you could take it up in your hands and carry it if you wished to go across a ploughed field.

Colonel LONSDALE HALE: In this lecture there is a paragraph of which one would be glad to have an interpretation, because it seems the most important paragraph of the whole lecture. It is as follows: "The cycle is now recognized by our military authorities as one of the means of transport for that motile infantry which may possibly in the future supply that fire-power so long needed by cavalry when employed far in advance of the marching columns of an army." I do not know whether Colonel Savile when he wrote that paragraph meant to inform us that the military authorities had really recognized the cyclists on the same footing as mounted infantry or dismounted cavalry in advance of the marching columns of any army we may put into the field. If that be the case, it must be an absolute revelation to all of us that the authorities have accepted them on the same footing as dismounted cavalry and mounted infantry. About these we have some experience, we know from the experience of past wars what dismounted cavalry can do, and what mounted infantry can do, but not one of us has the slightest notion of what a mounted cyclist can do in actual war. All these experiments that we hear of are not experiments which have been conducted in war, they have not had the trial of a campaign in any way, and all these records of work performed by cyclists are not over roads such as they would be after a campaign had lasted any time. I happened to have the pleasure of talking on this subject to a civilian who has been, I think, in all the wars of Europe for the last few years and in the American War. He said, "I hear a great deal about these cyclists, but I cannot understand how on earth they are going to get along, not the roads of England, or Continental Europe, which have not been traversed by an army, but over roads which have been traversed by an army, and where I have seen ruts 2 feet deep." I doubt that a cyclist could get over these roads under the circumstances of a campaign, and yet we are told by Colonel Savile that a cyclist corps is to be used in advance of an army, not merely a home army for the defence of England, which is an entirely different thing altogether, but any army they may put into the field. We are going to put an absolutely untried force into the field, and we cannot possibly tell whether they or their machines will be able to stand the wear and tear or not. It seems to me that Colonel Savile must be of a very sanguine temperament indeed. He has introduced the question of convoys, and has made a statement which I cannot help thinking to be a slip of the pen, for he tells us the great advantage of the cyclist is that he will be able to accompany a convoy, and, secondly, that the convoy will be able to go at quicker speed than if the escort were composed of infantry. My impression of convoys in actual war is that they get along at a remarkably slow pace, not perhaps a mile an hour. It is not the escort that delays the convoy, but the convoy that delays the escort, and therefore the claim that the convoy could move faster with an escort of cyclists seems to be without foundation. When we hear of cyclists being used as an escort to convoys going at this rate, it brings to my mind the spectacle presented on Saturday last in the streets of London. One of the very finest volunteer regiments was going to be inspected at Hyde Park, the Post Office Volunteers, and following them were their cyclists, not mounted but on foot. I had the pleasure of seeing to-day Colonel Du Plat Taylor, who commanded it, and I said, "Why were your cyclists going on foot?" "Oh," he said, "it would have been very hard for them to have followed at 3½ miles an hour on their

cycles; it was far easier for them to dismount and not ride." I have always been under the impression that if you have to go at a slow pace it is much easier to walk than to ride your cycle. Now, if we are going to use these cycles in advance to help our cavalry, one would naturally have preferred that the cyclists should have developed their tactics. Colonel Savile is a Professor of Tactics, and he has given us a curious instance of cycle tactics in the little account he gave us of the attack of a position. It is very easy to defend a position by your cyclists, because they can keep their cycles near them and bolt away as hard as they like, but he says the cyclists cannot pursue, because they had to go back 600 yards to pick up their cycles. I should like to defend a position against Colonel Savile, if he has to retire 600 yards after taking that position, because then I will come back and re-take the position. If you are going to adopt cycles in the field, you are bringing in a new form of tactics, of which we have had no experience whatever; therefore it is a little bit premature to talk of bringing them in front of an army; that is entirely different to what in my humble opinion is the true use of cycles. You will observe that foreign armies, although they are bringing their cyclists in, bring them in as a means of communication, but not one army to which Colonel Savile has referred talks of them as a substitute for mounted infantry. It is left for us to do that, to use them as a mounted body, fulfilling, as Colonel Savile says, all the functions of mounted infantry. But they could fulfil a great function among the volunteers. Directly that volunteer force is brigaded, of which we have heard in the paper to-day, it should possess an organized body of volunteer cyclists; it should be an integral part of itself. If you have a brigade of volunteers, say at York or at Bradford, and that is ordered to move, they have not at the present time the slightest means, not only of obtaining information, but of preventing any cavalry coming down on them from the front. If every volunteer brigade and Division had its organized body of cyclists, those cyclists immediately it was mobilized would go out to the front, not merely to obtain information, but to hold in small bodies of from twenty to twenty-five men all the network of roads that lay to the front, and through that network of bodies of twenty-five cyclists I venture to say no cavalry could ever break, or break only with the greatest difficulty. A volunteer corps, it does not matter what size it may be, which is provided with this outlying force of volunteer cyclists, need not have cause to regret the absence of mounted infantry which they cannot get, or of cavalry which they cannot get either; they can be self-dependent and self-protective. That seems to be the *rôle* to be played by volunteer cyclists. Do not let them be too ambitious, but let them confine their attention entirely to their own branch of the Service, and let them learn by practice their cycle tactics, and let them actually become that efficient guard and network in front to which I have referred. I may just mention in conclusion that towards the close of the last Kriegsspiel season in London, Lord Kilmarnock was good enough to take charge of an imaginary force of 400 cavalry, and Lieutenant Balfour of 400 cyclists; the 400 cavalry started from Woking and the 400 cyclists from Farnham to work on the Kriegsspiel against each other. It was a friendly exercise entirely; neither side wished to win or lose, but as these different forces came in contact I, as umpire-in-chief, consulted the combatants and arrived as far as I could at a conclusion; and I think Lieutenant Balfour will bear me out in saying that he with his cyclists was able entirely to seal all the roads from Woking to Farnham. That I submit is the true use of cycles in the present stage. If they are so used they will then be able to develop their organization, tactics, and so forth, and then will be the time, and not till then, when they may put themselves forward in any way as a substitute for mounted infantry or dismounted cavalry.

Lieutenant EUSTACE BALFOUR, London Scottish R.V.: My Lord, the first point which strikes me as worth mentioning is the particular development that cyclists may expect, purely from the volunteer point of view. I do not wish to go beyond that in what I have to say. We volunteers have hitherto failed to obtain light horse or mounted infantry in numbers of any serious importance, and Lord Melgund, who is present, will, I think, bear me out in saying that it is only with very great difficulty, under present conditions, that he is able to keep even his small body of mounted infantry up to their present strength. Thus we have a force of 230,000 men practically without any quickly-moving troops at all. So that, if it

could be shown that cyclists could take the place of mounted infantry or cavalry, as far as scouting work or the carrying of messages and orders is concerned, the volunteers would be placed in an entirely different position. Colonel Lonsdale Hale seems to think that cyclists can be used effectively chiefly in defence or in rear-guard actions. This view is borne out to a certain extent by what experience we have had. But I think he limits cyclists too much. He talks about "sealing up roads," as if this were the only function which cyclists could perform. It is perfectly true that in the manœuvres we have had, and during the little experience we have gained, in the last two years, it has become evident that cyclists could not from some points of view act with the same facilities as an advanced guard as they could as a rear guard. In the small actions at Easter this year the rear guard undoubtedly was able to escape from successive positions, although opposed by a superior force after having forced the attack to deploy, and advance on foot. In these particular instances they rightly chose their point of resistance at the tops of hills, from which they were able to run down to the rear and take up fresh positions on the tops of the next crests; whereas the attacking force had to go back to its cycles before it could pursue; exactly as Colonel Savile has described. I cannot, however, accept that simple method of tactics, which was partly due to a somewhat unique arrangement of roads, as final. I do not think that a similar state of things will arise frequently. It seems to me that there are many cases in which the attacking party might force the defending party to retreat without the former having to leave their cycles at all. Thus when parallel roads exist the mere threat of a turning movement would enable the attacking party to advance without the necessity of dismounting. In some cases also, where there are open downs, the attacking party could extend, pushing their cycles, and dropping them at a moment's notice, when firing was necessary; and in this case if they were obliged to retreat they could concentrate on to the nearest road. It should also be borne in mind, that cyclists are so much cheaper than cavalry, that for the same amount of money double the force could be put into the field. And in this case it could be arranged that there would be a succession of fighting lines and supports, one replacing the other. And each would thus mount, and, advancing through the other, there would be no delay in returning for machines in the successive attacks. These are only a few cases out of many in which I think that the attacking cyclist force would not be at a disadvantage as compared with the defending force. But in any case, whatever the success of these proposed tactics, it is clearly admitted on all hands that in rear-guard action cyclists would be very effective. There is only one other little point to which I wish to refer, namely, the question as to whether single bicycles or multicycles will prove to be the most valuable for military work. Colonel Savile speaks very strongly in favour of safety bicycles, and from a volunteer point of view I entirely agree with him. But I venture to think that, from other points of view, what are called multicycles may have great advantages. Major Fox, who commands the regular cyclists at Aldershot, has had much opportunity in gaining experience in this direction, and I wish he were here to give us the benefit of his views. But it seems to me that, apart from all other considerations, multicycles have two great advantages. The first is the fact that, in a column of route, they take up very much less distance than the corresponding number of single bicycles. The second is that, in case of attack or defence, a single man can advance or retire a machine which can carry four to six fighting men. On the other hand, however, it is clearly necessary that a portion of every cyclist force should be mounted on single safety bicyles, as single men may have to act alone, either for the purpose of conveying information or orders, or for the purpose of scouting individually to the front or flanks of the main body.

Major BLOOMFIELD: I may perhaps be allowed to mention the practical experience of the use of cyclist scouts by a battalion acting as an independent force. On three occasions at the Easter Manœuvres we (1st V.B. Royal Sussex Regiment) represented the enemy, and took up positions to resist the advance of the marching columns. In 1885, the columns moving on Brighton were coming down in five or six bodies, each on a separate road, two or more of them with yeomanry cavalry and mounted infantry. We were without cavalry of any kind, and I then suggested to Colonel Tamplin, my Commanding Officer, that cyclist scouts might be employed.

We ascertained that on one of the roads there was a position, extremely strong against any attack from the front, but liable to be turned by parallel roads. This position we took up with our main body, sending a detachment to the east to hold a bridge on one of the other roads, cyclists being thrown out as scouts to the front and on each flank. I may tell you briefly that the scouts on the road leading directly to our position, upon which Colonel Moncrieff's column was advancing, were able to bring us frequent reports of its progress whilst some miles distant. Three of the flanking cyclists on the road to the east were unfortunately captured, but one got away, reported to the detachment holding the brigade on that road, and then by a cross road to the Officer commanding the main body. The result was that we could safely have held our strong position, and thereby delayed the enemy very much longer than we could have dared under any other circumstances, as our flanks were secure so long as the bridge was held and the cyclists on the other flank reported all safe. In 1887, when a force under Colonel Tucker was moving from Hailsham to Eastbourne, the battalion was detained at Polegate, and leaving a company to cover a post of flag signallers, the remainder marched to take up a position upon the high downs to the south, our cyclist scouts being pushed out north, east, and west to feel for the enemy. Colonel Tucker endeavoured to turn our flank from the west, but the movement was detected by our scouts as soon as commenced, and reported to us an hour and a quarter before the turning column came in sight of our position. To reach this position the scouts, when driven in, had to face a very steep hill, but they managed to do so, most of them without any assistance, although the ascent was very severe. This year, still representing the enemy, we held, north of Hailsham, a position fairly strong as regards frontal attack, but with one flank liable to be turned from the north by a parallel road. A flag-signal post was established in a mill overlooking the valley which we occupied and the road by which the enemy, should he attempt to turn our flank, must come. This post was visible from our position, and the signallers reported from time to time that no enemy was in sight. At last they signalled a message from a cyclist scout, "No enemy within 3 miles on road to north;" so that we knew we could safely hold our position for another hour. These are the experiences of a single battalion compelled to protect itself against an enemy, not only superior in force, but having a choice of roads by which to advance. There is one other matter I should like to mention, namely, the capabilities of the cycle for military surveying. Some of our cycle section have experimented as to the actual running of their machines, and they find them practically accurate, while the small error is constant. Probably from the compression of the india-rubber tyre and from a slight deviation in the track of the cycle, the distance covered is about 1 per cent. short of that indicated by the revolutions. Those who have had experience in surveying will require no lengthy explanation of the advantages to be derived from the use of a machine that not only enables you to cover ground rapidly but, with a cyclometer attached, measures your distances whilst you are making observations. A cycling party, one of whom only need be a trained surveyor, could do still more. The trained man, mounted by preference on a front-steering tricycle, would work steadily along the main road, whilst the other would be able to reconnoitre the side roads and positions, reporting to their leader. I must apologize for having introduced to this meeting a matter which, at first sight, may appear of so small a character, but I thought it might be well that the experiences which we, working in our humble way, had acquired, should be generally known, as they might be of some value to others.

Colonel KENSINGTON: Perhaps I may be allowed to say a few words on the subject, as I had the pleasure of serving under Colonel Savile at the Easter manœuvres last year. I think with regard to the employment of cyclists in the fighting line of an army that that is hardly their province. They are more required to be of use to the Commanding Officer for any service that he may need. It appears to me that it cannot but be of immense advantage to have a body of men thoroughly reliable, thoroughly athletic as cyclists must be, who can be dispatched either as messengers on interior lines of communication, or to seize and hold a bridge or an advanced post, or, as has just been shown us, for keeping a detached force acquainted with the enemy's movements. I wish to say a word with regard to the type of cycles. I fully agree with Colonel Savile in thinking that the rear-

driving safety is the right machine for military purposes for the reasons he has given, and particularly because it is adaptable to men of any size. But he says that he is unable to see any advantage in the "ordinary bicycle." Now, as I have ridden an ordinary bicycle more than any other, I am able to claim two minor advantages attaching to it: one, that the hands of the rider are more free for any purpose, such as taking notes of the country, because a good rider can take his hands off the bar and steer with his feet to a certain extent; another, that he is able to see more over the surrounding country. I have ridden both classes of machines, and have found that my view of the country is much more extensive on the ordinary bicycle than on a rear-driving safety. At the same time I do not think the disadvantage of the rider being thereby more visible to the enemy is worth considering, he raises no dust and makes no noise, so that I doubt any bicycle rider being noticed except at close distances. I slightly differ from Colonel Savile as to the pace of cycling over bad roads. He cannot conceive their going slower than 14 miles in three and a half hours. As Colonel Hale has pointed out, roads after being cut up by traffic might be almost unrideable; and I think cyclists might well be forced to go slower than the 4 miles per hour estimated by Colonel Savile if the roads are very bad. I can imagine nothing worse for cyclists than a long distance of dead level roads, muddy and cut up, and against an adverse wind. On hilly ground a cyclist can usually find portions of the roads rideable, but on a dead level, such as I have described, he would be able to make but slow progress; yet he will always go faster than infantry, even pushing his machine, in consequence of his superior staying power, and frequently, on good roads, faster than cavalry. These are the only points on which I differ from Colonel Savile, to whom my thanks are due as a cyclist and a soldier for the admirable and temperate way in which he has put the possibilities of military cycling before us.

General Sir ROBERT HUME: It is of course difficult, my Lord, for any one to lay down at present what the use of military cyclists may be eventually; but there are several objects that they certainly might carry out with advantage, and one of them that strikes me is maintaining communication between outposts and positions and long lines of communication. I think that that on service would be proper use to which to put cyclists, and if you were commanding a force with a long extended line of communications of some 100, 150, or 200 miles, which we have at times, you would save your cavalry very much if you had some trained cyclists to keep up the communication between your posts. Of course they would necessarily be armed and equipped and able to take care of themselves. That is an idea that has not been mentioned by other Officers who have spoken, and I do not think it was referred to by the lecturer; but it is one of the many cases in which military cyclists might be well and usefully employed to the advantage of the Service.

Colonel COOPER KING: My Lord, I am afraid I cannot add very much information to that furnished by the very excellent and exhaustive paper that Colonel Savile has read to-day. My only ground for speaking at all is the fact that I had the honour of being an umpire at the Easter Manœuvres, and saw for the first time in my life what cyclists could do. I am not a cyclist myself. I have ridden a machine but once, and I do not wish ever to ride another. I went, therefore, with a perfectly unbiassed mind. I did not know one machine from another. I did not know a safety from a tall one, except in a general kind of way. I went down with a perfectly open mind, and I came back very much impressed with a sense of the possibly great development of the machine; in what way I could not see then entirely, any more than I can see now. I quite agree with Colonel Lonsdale Hale when he says that at present certainly it would be unadvisable to apply it to foreign war; but I did not know that Colonel Savile thought of doing so for many years to come. I understood him to mean as I do, that he wished to let the volunteers work it out, and to let us see in course of time whether anything more should be done. This is what I saw. I went down with Colonel Savile on Good Friday, and saw the men start in the morning and cover in that day 60 miles. No armed force I know of could have covered the same distance in that time. It was very bad weather, a very bad road, a very heavy head wind coming in strong gusts right into the face of the rider; and with either men on horses, or men in carts, the progress made would have been very slow. It is true that a portion of the 60 miles covered

on that day was done by train, but still even then it was traversed more quickly than any other arm would have done it. In fifteen minutes from the time the train came into the station the men were entrained—150 men with all their machines and kit. It would have taken a very much longer time to have entrained a squadron of cavalry, or of any other arm that I know of, to have covered 60 miles, and to have got to their destination in good fighting trim as Colonel Savile's command did. The whole of the force, it is true, did not get to the scene of action, but if you take the average tailing off of any column, I think you will find that the number left behind in the course of the march was no greater than would have been the case in any other long march with any other troops. A very small proportion was unable to get on, something less than a third I think, and the remaining two-thirds came into action, every man with 120 rounds of ammunition, and every man able and game to fight. Nobody was required to hold the machines, every cyclist was available. I think that is a strong point. I say that for the volunteer brigades that are going to be formed, it will be a most advantageous thing to have men on cycles able to go forward in advance of these organized bodies, and cyclists can do so as well as any force that I know of in any country in the world. The only point I would suggest is this. I would make the cyclists of these brigades become "efficient" only on the condition that they themselves know all the roads of their district. I would make it a *sine quâ non* that they should be perfectly acquainted with their local roads, and in that case when a certain brigade was taken from one part of England to another the cyclists of the new district would act as guides. It would be most important to insist that the men, for instance, on the borders of Berkshire should know every Berkshire road. I think it is well worthy the consideration of the authorities in forming the sections that that knowledge should be required for passing the examination to become an efficient cyclist volunteer. I should like to refer to one or two remarks made by Colonel Hale. It is quite true that when the position that he referred to was forced, the attackers had to go back to their machines, but the defence had by that time gone clean out of sight; they got away very rapidly, and I do not think that they would have had time to return and take up again the position which they had left before the assailants had reached the crest of the hill, and could oppose them. The defending force had got away more than a mile before the attackers reached the plateau. It was a special case of defence on a single roadway. There were no means of turning the flank. I hold that if the cyclists could have been divided into two different bodies, one operating on the flank and the other in front, the defence would never have been so prolonged as it was. It was a very peculiar attack; you could not turn the position, but you had to take it in front; it was inevitable, therefore, that the assailants should leave their machines, because they could not take up a flanking movement on them. Under different conditions of ground the difficulty might have been very much modified. I am not learned enough about riding to know how far men can wheel their machines in pairs or what not; but I think they might have some method of knitting them together, so as to bring them more closely up by one or two men only, but that is a matter of technical detail which will have to be considered.

Colonel SAVILE: There seems to be very little for me to answer. The first, and perhaps the most important point, is that Colonel Hale asks me upon what authority I make the statement that "the cycle is now recognized by our military authorities as one of the means of transport for that mobile infantry which may possibly in the future supply the fire-power so long needed by cavalry when employed far in advance of the marching columns of an army." I make that statement, simply as a natural deduction from what the military authorities are doing with regard to cyclists at the present moment. If that deduction is erroneous, I am sure I shall be corrected in another moment by the noble Chairman, but I think it is a fair deduction to make. I feel sure that a War Office Committee would not have been convened to work out those matters which I have mentioned, or to consider the conditions of efficiency of volunteer cyclists, and there would be no thought of bringing out a drill book for cyclists, also cyclists at Easter Manœuvres would not have been encouraged to go out, and do tactical operations, if it were intended to restrict the functions of military cyclists simply to message carrying and orderly duty. I base my opinion upon what we are doing, and what the authorities are encouraging

us to do, asking us to carry rifles and a large quantity of ammunition on our machines. If the cyclists were intended to be used only as messengers, they could be obtained just in the same way that the French get them, viz., by advertising in the papers for civilians to come forward and act as messengers and despatch carriers during field manœuvres. There seems to me to be no reason for regular organization if their functions are so restricted. I think we are going beyond that. I do not say that the military authorities have finally decided to use cyclists as fighting men, but that it is proposed to give them a trial, and find out whether they are fit for the duties of mobile infantry. I do not understand why cyclists should be considered good enough to do tactical work at home but not abroad. I should say that if work ever has to be done well, it will certainly have to be done well when we have an enemy in England, and close to London. Why then should the cyclists be considered fit to scout and reconnoitre at home, if they cannot do such work in other civilized countries? Colonel Kensington said cyclists he thought ought not to fight, but they might seize a bridge. If you are to seize a bridge which is defended by the enemy, I imagine you would have to fight for it, and if it be required to seize a bridge, I imagine it is also necessary for you to hold that bridge, and consequently the cyclist might have to fight to hold it. I do not see why a cyclist should not fight. He does not fight on his machine; he drops his machine and is an infantry soldier. To say that cyclists cannot fight, is to say that infantry cannot fight![1]

The CHAIRMAN (Lord Wolseley): Gentlemen, I think the lecture has not only been very interesting, but also the discussion. I have listened with very great interest to what my friend Colonel Hale has said, as I always do to anything he says upon subjects connected with tactics, or in fact upon any military subject. I do not quite know whether his remarks were intended to elicit the observations and opinions of others, or whether he really and exactly meant everything he said to be taken literally.

Colonel HALE: No, Sir, it is a *bonâ fide* question of mine entirely. Colonel Savile mistook my point: that paragraph reads exactly as if the military authorities had come to the determination to accept cyclists on the same footing as dismounted cavalry or mounted infantry. I will read it again: "The cycle is now recognized by our military authorities as one of the means of transport for that mobile infantry which may possibly in the future supply the fire-power so long needed by cavalry when employed far in advance of the marching columns of an army." That seems to me to read that the military authorities have said: "For cyclists are just as good as mounted infantry or cavalry." That is a *bonâ fide* question, not intended as a "draw" in any way.

The CHAIRMAN: I have at least drawn an explanation from Colonel Hale as to his exact meaning. But although I am generally in accord with what he says, I confess I cannot agree with what he stated in his remarks upon cyclists for military purposes. The pith of his remarks comes to this: he said, "You ought not to try cycles, and that it is rather absurd to think of employing them in war, because they have never been used there before." Of course if you are never going to employ men or cycles in war until they have been tried there before, you get rather into a vicious circle.

Colonel HALE: I hardly intended that; but this extraordinary specimen of cycle tactics which Colonel Savile brought before us, about this taking of a position and so on, staggered me, and I rather distrusted their tactics.

The CHAIRMAN: That of course is a very important point. When novelties are first started, they always have a great number of opponents. We all know that when gunpowder was first introduced people hated it, and we have the greatest of all English poets condemning it and laughing at it, and bemoaning that it was ever in-

[1] I accidentally omitted to reply to Colonel Hale's remarks upon my ideas concerning the employment of cyclists as an escort for a convoy. My contention is that cyclists could with advantage be equally well employed for such a purpose when it is desirable that the escort should be one capable of moving quickly or reconnoitring widely, or when an infantry escort will suffice.

troduced into England. In the same way we find in our own time, there was a very great section, I may say the bulk of our own Officers, who hated the introduction of rifles into the Army; there always will be in an institution like the Army, which is essentially a Conservative institution—I do not mean politically—a very strong feeling against any new invention, or any novelty that changes or tends to change our system of applied tactics. I confess I am one of those who believe in novelties, and the moment I hear of a new idea or a new invention which I think will help the military profession, the tendency in my mind is to try and get hold of it and see what good we can make out of it. I have thought a great deal for a long time upon the subject of mounted infantry, for example, and I am very glad to say that it is being generally recognized as an arm of our Service, and a very important arm it has become. On many recent occasions it has performed most important services. In our little wars it has been found far more useful than cavalry, infantry, or artillery. That I say is an example of a novelty which was very much opposed. I am sorry to say it is still opposed by some. When talking of cycles, it is impossible to dissociate cyclists from mounted infantry, because I rather agree with Colonel Savile that what you want in mounted infantry is a thoroughly trained infantry soldier who can hit the enemy at all points, and from all directions, by travelling over long distances in a much shorter time than a man on foot or horseback can do. It is all a question of easy and rapid locomotion to ensure the attack by a body of picked infantry, on a selected point of the enemy's line some 40, 50, or 100 miles distant from where your army may be, and to bring the men there in good fighting condition. Our ordinary mounted infantry are only capable of doing 30 or 40 miles at a push, but if you have a large body of cyclists as a component part of your mounted infantry force, the General Commanding, in most countries in the world, will find that he has at his command a most important and a very valuable body of men. When discussing the use of cyclists you must consider them under two heads: first of all as purely mounted infantry, and secondly as intended to perform those duties on which so much stress has been laid by some to-day, namely, those of the mounted orderly in camp or on the line of march or with outposts, and keeping up the communications between one part of the army and another, in whatever position it may be. It is quite possible that the men intended to perform these two different functions might be armed in a different way. For instance, in connection with outposts it is very important to have always some means of communicating from them with the main body in rear. In our recent regulations for outposts we lay it down that there should be with every large body of outposts a small detachment of cavalry to act as orderlies, to enable the pickets to send back communications and information to the Officer commanding the outposts in rear. Instead of thus drawing upon our cavalry for orderlies—always a poor way of using up your mounted men—if each outpost had some two, three, or four good cyclists, all the work that has now to be done by cavalry orderlies could be done by them. Our cavalry could then be reserved for more important and for purely cavalry work. Cyclists intended for the rapid conveyance of news and of messages might, I think, be simply armed with a pistol, and need not be encumbered with a rifle. That substitution of cyclists for cavalry orderlies would be a great advantage, but it is only one of the benefits which in my opinion the use of cyclists in war will confer upon us. I believe the day will come, and is coming soon, when large bodies of cyclists will be a recognized and integral part of every army in the world. There are very few countries in the world where you cannot use cycles. Cast your mind back to the Indian Mutiny, and there are a good number of Officers present who saw a good deal more of it than I did. During the whole time I was in India at that epoch, I do not remember, except when actually in the hills for three or four days' fighting, I do not remember one day's march, or any one fight in which we took part, where cyclists could not have been used with the greatest possible advantage. The country I campaigned in then was Oude, which only had one main road, namely, the road from Cawnpore to Lucknow, a distance of 50 miles. In all other parts of the country there were no roads at all. We moved along small by-paths and cart tracks on which no care had ever been bestowed, and yet I am quite sure that cyclists could have played a very important part, and performed most useful functions on all those roads and all over

that open country, had they been thought of at that time. A force of cyclists is eminently calculated for active service in India. Stress has been laid upon bad weather and bad roads rendering cyclists useless; but if you turn out any army during heavy rain, into a country where the roads are very bad, and the ruts 2 feet deep—I have no doubt such roads exist, I have seen many of them myself in bad weather—I very much doubt if any army could pass over the country at all under those circumstances; and I am quite certain that the man who uses a cavalry force in such a country in very bad weather will have a very poor-looking lot of horses at the end of the first fortnight or three weeks' work; whereas if he used men on wheels, on tricycles or bicycles, he may not be able to make long marches, but at the end of three weeks' bad weather, when the sun does shine again, and he has fine weather to begin operations, he will find his bicycles and tricyles exactly in the same condition as before the bad weather set in. Bad food does not tell upon them. As regards the use of cyclists at home, I think most people will admit that in a great part of England, particularly that part of England over which an invading force would have to pass, the ground is so closely cultivated and so covered with hedges, so cut up by walled roads, that it would be impossible for him to use cavalry tactically as cavalry, although of course they could be used in action dismounted with great advantage. They could be used like mounted infantry at long distances on flanks of enemy, and so could the cyclists. Those who study the use to which our cavalry could be put in the defence of England will find, I think, that its power and usefulness would be very largely enhanced if each regiment or brigade of cavalry had with it a considerable force of cyclists. I do not think I have anything else particularly to note, except to say that if the cyclist loses his bicycle, he is in no worse position than the cavalry soldier whose horse is shot. We have all listened, I am sure, with very great interest to Colonel Savile's lecture. I think that all who take interest in cycles and cycling as applied to military purposes ought to be very grateful indeed for what he and a few other Officers have done for cyclists in this country. I see my friend Major Knox Holmes present, and also many others whom I know take an interest in what I might almost now call this new arm of the Service, although it has not yet been formally adopted. I think we all owe a deep debt of gratitude to Colonel Savile for the manner in which he has pushed this question of army cycling, and also for the very interesting lecture he has given on it to-day.

Friday, June 22, 1888.

MAJOR-GENERAL EDWARD H. CLIVE, Commandant Staff College, in the Chair.

FIRE DISCIPLINE AND THE SUPPLY OF AMMUNITION IN THE FIELD AS PROVIDED FOR BY FOREIGN POWERS.

By Captain WALTER H. JAMES, F.G.S.

IT is often said that modern war is less deadly than ancient, that the loss of life which a nation suffers in the fighting of to-day is more moderate than that which occurred in olden times. This may be true as regards the general result, but certainly the improvements in modern arms have rendered the losses at the points where collision actually takes place far more deadly than they were with the old weapons. It must not be forgotten that, arduous and difficult as was the fighting in the Franco-German or the Russo-Turkish Wars, the improvements which have since taken place both in small-arms and cannon have enormously increased the power of these weapons. Shrapnel shells have placed a power in the hands of the artillery, the effect of which has as yet been seen in no war fought between civilized nations. The introduction of high explosives has rendered common shells far more destructive and dangerous; while the proposed introduction of really small-bore rifles, having nearly double the range of any arm yet used in war, and the magazine arrangements of which will increase and intensify the power of fire from them, have augmented enormously the power of the infantry rifle. These technical improvements, while men and horses have remained what they were before, have totally changed the face of modern tactics.

The time at my disposal prevents my dealing with the many problems which these changes have given rise to; nor would a discussion on these heads be exactly germane to the subject which I have to-day, at the request of the Council of this Institution, to offer for your consideration; but it is evident that improvements in guns and rifles will lead to a great extension of the zone in which bullet fire is to be dreaded; while the introduction of high explosives, and thereby the increased power of the bursting charges of shells, will produce enormous moral effect both by their effect on human beings and by the wide-spread and rapid destruction which they will cause in buildings and other erections.

To meet these new conditions of warfare, troops will have to take up formations which themselves offer as little target as possible to the mass of projectiles hurled against them, at distances hitherto almost undreamt of, and which hardly any European Army seems yet sufficiently to have taken into account in its formations.

These considerations, based on the effects produced by modern arms, all point in one direction, viz., the absolute necessity of practising the men in peace-time in the use of their weapons, so that they shall be able to obtain the best possible effects from them in war. They point, therefore, to simplification of the mechanical parts of a soldier's training, so that as little time as need be shall be given to drill, and as much as possible to field-instruction. Drill—while as necessary, nay, perhaps more necessary than ever to ensure discipline and absolute reliance on leadership—will not take the place of instruction which must teach the soldier what to do in the ever-varying phases of a modern combat. The distances he has to advance over now, not in the close formation in which he had but to obey the voice of his leader, but in open order in which, while equally obedient, he must be more self-reliant, and the enormously destructive character of the fire which he has to go through, plainly show that only in the daily peace practice of what he is called upon to do in war, can be found an adequate solution of the problem. The modern soldier is becoming every day more like the ancient Roman legionary, that is to say, he must keep himself in proper fighting condition by the habitual practice of the task required of him.

In no army in Europe has this principle been more fully recognized than in the Prussian. The drill formations have been few and simple; and yet almost the first military utterance of the late Emperor[1] was one in which he foreshadowed the early introduction of still simpler forms. What is the main business of the infantry soldier? To shoot straight. Hence he must be trained to bring up his shooting capacity to the very highest point possible, and the systems of infantry attack and defence must be designed with a view to this end. The proper control of the soldier when in action; the regulation of his fire, so that it shall be effectually and properly directed to the object of the fight, not thrown away without adequate result; and the keeping up and maintaining of an adequate supply of ammunition for these purposes, these two objects are only to be gained by an adequate system of fire discipline and of ammunition supply, which thus form the two main points to be considered in modern infantry fighting.

The Prussian Regulations.

The Prussian Regulations divide infantry ranges into three classes, viz., *Close ranges*, under 400 metres, say 450 yards; *Moderate ranges*, between 450 and 900 yards; and *Long ranges*, above 900 yards. At distances exceeding the last-named, an adequate result is only to be

[1] The new Prussian Field Exercise has been published to-day, 15th September, 1888.

obtained by a considerable expenditure of ammunition, and only objects therefore should be fired at whose height, length, and breadth offer favourable targets. Two different sights are to be employed as a rule for distances over 600 metres (660 yards), unless the range is accurately known, when one only is to be used. But this division of sights is not to take place unless the body of men using them is of the strength of a *zug*, *i.e.*, one-third of a company, or about 60 to 80 men. Above 450 yards, the bottom of the target should be aimed at.

It is recommended for facility of control over the fire, that the different sections forming the fighting line be kept in as close formation as the enemy's fire permits, and with distinct spaces between them. Ranges should be carefully ascertained from maps, or from infantry and artillery already in action. If the ground in front of the target permit the effect of the projectiles to be seen, ranges may be ascertained by volleys. The *zug* leader is recommended to keep near him two or three good judges of distance, who should estimate the range of the various objects to be fired at.

On the defensive, ranges should be marked out by objects which are clearly visible to the defender but not to the assailant. The choice of a target will depend first of all on tactical considerations; secondly, on the probability of a good result from the fire. The range should not be often altered, because to do so, leads to waste of fire. Before opening fire it must be remembered that the amount of ammunition carried is limited, and that it should only be expended where an adequate return may be expected. But once it has been determined to open fire, a sufficient number of rounds should be expended to attain the required result.

The rapidity of fire must depend on the object of the fight, the form of target, and the ammunition available. A quick rate should only be used at close ranges, but against artillery a rapid fire may be employed at distances over 900 yards.

The kinds of fire recognized are—*volley*, *independent*, and *magazine fire*.

Volley firing, whether from an extended or closed line, has the advantage of keeping the troops better in hand, and allowing the effect of the fire to be better observed. But as the voice cannot be heard in the noise of the fight except with difficulty by a *zug* in close order, and still less by one in open order, volley firing must perforce be confined to the commencement of the fight, and to moments when troops are not under effective fire.

Independent fire is considered as probably more efficient, because the men can select the moment to fire, and can aim undisturbedly. The men are to be taught to depend for results, not on the number of shots fired, but on their being well aimed. The rapidity of fire will be indicated by the words "quick" (*lebhaft*) or "slow fire." (*langsam*). If the command to lessen the rapidity be not attended to, the fire should be stopped altogether, and then again commenced. In addition to these two kinds of fire, a distinction is also made between independent fire in accordance with orders, and independent fire left wholly to the judgment of the men.

Magazine fire is, as a rule, only to be used at close ranges, and at decisive moments such as the time immediately preceding the assault on a position, or, on the defensive, to beat back such an assault. It will also be used to defeat cavalry, and on occasions when an enemy is suddenly encountered. The men must be carefully practised only to use the magazine at moments such as these, or when a pressing need demands it. The use of magazine fire at ranges between 330 yards and 900 yards, *i.e.*, beyond those reached by the flap sight,[1] is only to be made use of against objects of sufficient surface exposed to fire only for a short time.

The direction of fire on a given object is one of the most difficult tasks of an infantry leader, which is only to be attained by an accurate indication of the object and accurate orders. The word of command must be short, and must give, first of all, the direction, next the object, then the sight, and, lastly, the nature of the fire. For example, "At the artillery on the green hill, sights for 900 and 1,000 yards, quick independent firing;"

Or "Straight to front, at the lying-down skirmishers, 500 yards sight, independent firing;"

Or "At the cavalry by the white house, flap sight, magazine fire;"

Or "Magazine—Present—Fire—Load."

Firing will be stopped at the word "Cease fire," or by the group-leaders whistling. The whistle is an attention signal, and the men must at once cease firing or loading, and wait attentively for the next command, as, for example, to change the direction of fire, to alter one of the sights employed, or to aim differently.

It is necessary to observe continually the effect of the fire by means of field-glasses, and to judge from the fall of the bullets, or the appearance of the enemy, whether the point aimed at is struck and the sighting correct. The leaders of the firing line should, if possible, take up such a position, having regard to the direction of the wind, as will enable them to observe the effects of the fire. If the smoke prevent them doing this, special observers should be stationed under cover on a flank to note the effect, and communicate the same to the leaders of the firing line by means of signals previously agreed on, by shouting, or by means of connecting links.

It is impossible to define absolutely the duties of the various ranks, but generally they are as follows:—

The battalion commander and superior Officers define the direction of attack, and in general terms the object to be aimed at, but only exceptionally can they be in a position to determine when fire should be opened. It is their duty to see that a fresh supply of ammunition is sent forward at the proper time.

The company leader orders the positions of the *züge*, judges the distances, orders, as a rule, the commencement of fire, and defines as long as he is able the point to be fired at. He regulates the movements of the men, observes the enemy and the effect of his men's

[1] 300 metres (330 yards) is the range for which the flap sight is used. The standing sight gives a range of 200 metres, or 220 yards.

fire, ensures the replacement of ammunition with the means available on the battle-field, and sees to the distribution of that brought up from the rear.

The *zug* leader sees that the *zug* takes up a proper position, and defines the object to be aimed at, in accordance with the direction of the company leader, or when in the course of the fight this becomes impossible on his own responsibility. He orders the sight to be employed, the commencement and nature of the fire, from what pouch the ammunition shall be taken, observes the effect of the fire, and orders it to cease if need be. He takes care, as long as he can control it, that the expenditure of ammunition should be slow and in proportion to the object to be gained. He observes the enemy and endeavours to act as much as possible in unison with the other *züge* in the firing line.

The group leader[1] is responsible that his group takes up the position ordered. He watches the sighting, the amount of ammunition employed, and the effect it produces, and sees that the men keep their magazines full. He passes on the commands of the *zug* leader to the neighbouring groups when necessary, and blows his whistle as soon as the *zug* leader uses his.

Fire discipline embraces a careful carrying out of the orders given during the combat, as well as a most careful observation of the manipulation of the weapons, and of the instructions laid down for conduct when fighting. It requires calm behaviour under the enemy's fire even when unable to return it, careful delivery of fire and use of the ground so as to increase the effect as much as possible, and constant observation of the enemy and of the leader. Fire must cease as soon as the target becomes invisible, or the leader orders "cease fire" by the whistle or otherwise.

Fire discipline must be so engrained into the men as to maintain its influence, even when owing to the conditions of the fight the leaders can no longer enforce it, and only the superiority of individuals or the example of especially brave and active men takes effect on the others. To rouse this spirit of self-reliance the men must be practised in the conditions in which leadership is no longer possible, and taught how to conduct themselves in them. As a general rule, they should understand when left to their own resources that they may (not must) only fire at high and wide objects at ranges between 450 and 900 yards; that at ranges over 900 yards they should not as a rule fire at all; but that at ranges under 450 yards they may fire at any object.

The French Regulations.

The French Regulations recognize three divisions in infantry ranges, *Close ranges*, under 450 yards; *Moderate ranges*, 450 to 900 yards; and *Long ranges*, between 900 yards and 1,650 yards.[2]

Individual infantry soldiers may be fired on up to 330 yards (300 metres), if standing or kneeling. A squad up to 550 yards. A

[1] The Prussian *züge* are divided into sections of not more than 6 nor less than 4 files, *i.e.*, 18 to 12 men. Men of a section form a fire group.

[2] For later particulars see Appendix.

line of skirmishers may be fired on at ranges varying from 550 to 900 yards, according to its density. Groups of men in close order may be fired at if 5 yards broad up to 900 yards, if 10 yards broad up to 1,100 yards, if 20 yards broad up to 1,300 yards. A section of artillery may be fired on up to 1,300 yards. Company columns, compact bodies of artillery or cavalry may be fired at up to 1,650 yards. Any distance beyond this is to be considered exceptional.

The 300 metre sight is considered the proper one to use for close fighting, as with it the ground is swept up to 350 metres (about 400 yards); against cavalry or men standing the 400 metre sight may be used between distances of 400 to 450 metres. Over this range a more accurate sighting is necessary. The range may be estimated by volleys of which the effect can be observed through glasses. Care should be taken that, to commence with, the elevation should be considerably less than the estimated range. The absence of dust is a clear proof that the range is too long, but dust in front of the target is no proof that it is too short, for in a well-regulated fire half the projectiles will fall behind and half in front.

Men may be stationed to observe the fire on the flank of the men delivering it.

Different sights are only to be used with caution. Against a moving object or one of considerable depth, two sights differing by 100 yards may be used, but not by smaller bodies than sections.

Fire is the preponderating influence in fighting. Its use cannot be left to individual will without danger of the ammunition being squandered and consequently being wanting when most needed. The regulation of fire is the duty of the Officers commanding the companies or their superiors in an early stage of the fight. The different kinds of fire admitted by the French Regulations are *volley*, *skirmishing fire*, *rapid fire*, and *magazine fire*. *Volleys* should be employed as long as possible, but they cannot be made use of except at long ranges, and then by order of the battalion or company commanders, nor, as a rule, by troops advancing to the attack, for they require immobility and an amount of safety from the enemy's projectiles incompatible with a vigorous offensive. Volleys may, however, be delivered by bodies told off for the purpose, by the reserves from lateral positions or from high ground. On the defensive they may be made use of up to the moment of the enemy's assault and even during it, since he (the enemy) advances without protection and no longer fires. Volleys should not generally be delivered by a larger body than a section, or in certain cases by a half company at ranges over 1,100 yards; at shorter ranges volleys may be fired by half-sections or squads.

Skirmishing fire is the usual kind of fire employed at medium ranges. The number of cartridges employed is usually three but is never to be more than four. It is considered to give better shooting results than volley firing, but has the disadvantage of letting the men more out of hand and rendering it more difficult to concentrate the fire. It is the fire to be employed generally in passing over the medium distances from the enemy. But a shooting line should not,

as a rule, open fire before 800 to 700 yards from the enemy in open ground, or 450 yards in difficult ground affording cover.

Rapid fire is only to be employed at ranges between 220 and 230 yards, *i.e.*, when the final stage is reached. The men should aim and fire rapidly, using the 300 yards sight.

Magazine fire is, as a general rule, not to be used at ranges over 150 metres, *i.e.*, 165 yards from the enemy, and then only at the word of command. But Officers commanding companies should not hesitate to use it at longer ranges against troops which suddenly appear or which may be visible only for a short time if proper loss can be inflicted on them. When the soldier has been using the magazine he should take the first opportunity to fill it up again.

The range at which fire should be opened depends upon the facilities for regulating the shooting, the nature of the ground, the vulnerability of the target, and its tactical importance. Distant fire may put the enemy in disorder and prevent them coming into action. It may render the occupation of an important point impossible, such as a bridge, a junction of roads, or the mouth of a defile whence the enemy must debouch. But it can rarely have a decisive effect. Its use, therefore, demands a just appreciation of the situation, and cannot be left in the hands of subordinate Officers. As a general rule, the Officers commanding the battalions or companies will determine the object to be fired at, the time to fire, and its duration. It is at close ranges that it is most necessary to have available the largest number of muskets and cartridges, as at these ranges it is that fire is the most powerful and effective. The attack should be prepared at long range by artillery, exceptionally only by infantry. To open fire prematurely serves only to lengthen the struggle and to exhaust the ammunition and the moral force of the troops. On the defensive, however, opportunities will more frequently occur for using long-range fire on targets of large dimensions—chiefly artillery. Such a fire will often have the effect of making the assailant assume prematurely open order and expend an undue amount of ammunition at long ranges.

The power of fire is considerably augmented by concentration, which is more easily obtained at medium ranges than at close ranges when the troops are more out of hand. The Officer commanding the battalion should indicate the objective at the moment the battalion deploys for the attack. The duty of conducting the fire devolves on the Officers commanding companies and those employed in the fighting line. The Captains determine the objects to fire at, the kind of fire to use, and the number of men to put in the fighting line during the preparatory period of the attack. While leaving details to the subordinate Officers they should take care that the men fire in the direction ordered, and endeavour to keep them in hand as long as possible. The section leaders order the sight to be used, the point to be aimed at, the number of cartridges to be employed, and regulate the intensity and duration of the fire.

The leaders of smaller units have to superintend the due carrying out of these orders.

The Austrian Regulations.

The Austrian Regulations divide infantry ranges into three classes —*close ranges* up to about 400 yards, *moderate ranges* between 400 and 850 yards, *long ranges* all over the latter. Firing is, as a rule, only to take place within moderate or close range. The various kinds of fire used by the Austrian infantry are—

1. Volley fire.
2. Marksmen fire.
3. Skirmishing fire.
4. Independent fire.

Volley fire may be used either by formed bodies or by groups (*Schwarme*[1]). The groups are to use volleys at moderate ranges and at close ranges as long as possible, especially against large, formed bodies of men. Volley firing should be used always against cavalry, and, as a rule, against artillery.

The skirmishing fire, used as a rule at moderate ranges, is to begin as a rule as marksmen's fire, *i.e.*, the marksmen only firing. At and within 500 yards, under certain circumstances, or at any rate at close ranges, it will be taken up by the whole of the men, *i.e.*, it becomes skirmishing fire. It is considered often desirable to limit the number of rounds to be fired.

Independent fire is only to be used at decisive moments, and the number of cartridges may or may not be defined.

Long-range fire is only to be made use of by closed bodies, and then only when the range can rightly be ascertained, the target clearly seen, and of such a size as to render probable a due result. Moreover, the expenditure of ammunition needed must not be so great as to render it likely to leave the troops without a proper supply when decisive ranges are reached, *i.e.*, if large, a fresh supply must be certain.

It may, postulating the above conditions, be made use of on the offensive. When it is necessary to enable troops to advance, or some decisive advantage may be obtained from it, *e.g.*, if the enemy's artillery can be affected, or the assailant's artillery cannot properly support the advance: also, when its use will facilitate the advance of other parts of the line, or when it is possible by employing it to concentrate an overwhelming fire on the point to be attacked, or when it can be used to enfilade a position which affords good cover against frontal fire.

On the defensive, long-range fire may be used so soon as proper targets are offered by the assailant. Again, a part not attacked can use it to bring an oblique or enfilading fire to bear on the troops attacking another part of the position. It may be used to stop the pushing forward of the assailant's artillery and also to hold the enemy at a particular part and prevent him advancing from it.

It may be employed on the offensive or defensive alike for pursuit, to cover a retreat, or against the enemy's staff and reconnoitring bodies of cavalry.

[1] A *schwarm* consists of four to seven files under a non-commissioned officer.

Two sights, differing by 100 paces, may be used for moderate ranges, three at the most for long ranges.

The battalion commander, as a rule, will determine when fire shall be opened, failing him the company commander; the section or group leaders only when they are acting independently.

The company commanders (failing the battalion commander) order the opening of fire, and designate the point to be fired at. The method of command is the same as in the Prussian Regulations, viz., the direction to be aimed at, the target, and then the sight or sights to be employed. If more objects than one present themselves, they should be fired at successively, *i.e.*, the second should not be fired at till a proper effect is produced on the first. The detail command of the firing is left to the section leaders.

When the company is firing at long ranges, it may be desirable to fire volleys to ascertain the range. These will, as a rule, be fired by the section nearest the Captain. In this case, as soon as it is seen that the range is obtained, the whole body must immediately fire, since the objects fired at at long ranges are usually visible but a short time.

The group commanders superintend the firing of their groups, carefully carrying out the orders of their section leaders. They must see that fire is not opened without orders. If they are good shots they may stimulate their men by an occasional shot, though as a rule they are not to fire. Before the group advances, or before the rapidity of fire is lessened, *e.g.*, independent fire changed into volleys, the group leader must see that the fire is completely stopped.

The section commanders are not to open fire from their sections, except when they are acting independently. It is their duty to superintend carefully the fire of their men, and to observe its effect.

The section and group leaders must keep themselves acquainted with the amount of ammunition in possession of their men, and see that a fresh supply is sent for in due time.

The section commanders must see that firing ceases—

(1) When an effect is no longer produced by it, or when an interval of rest is ordered;
(2) Before an advance, unless the section in question be covering the advance of a neighbouring one;
(3) To deceive the enemy, *e.g.*, to make him think a position is abandoned;
(4) When the ammunition is getting exhausted, in order to reserve the available amount for the decisive moment.

Fire should gradually increase in volume as the range becomes shorter and the target better seen, or otherwise more favourable. The greatest rapidity of fire should be made use of, and every rifle available put in line just before the final advance on the offensive, and when that has succeeded, in the pursuit, or to stop counter-attack when an attack is unsuccessful; on the defensive, as soon as the assailant arrives within close range, to pursue him when defeated, or to cover the defender's retreat.

The fire should also be as rapid as possible when large targets such as columns, batteries, &c., are fired at, or in case of surprise, but is at once to be stopped the moment the object is gained, and a calm, slow fire again opened.

Fire discipline requires the most exact carrying out of orders, a careful use of the rifle, quick observation of the signs and orders of the section or group leaders, continual observation of the enemy's fire, and calm demeanour under it till the order is given to open fire, an absolute cessation of fire the moment the order is given, or the named number of cartridges have been fired.

All these points must be so carefully instilled into the men by careful training that there may be no doubt as to their carrying them out on service. A soldier who is a good shot will never fire unless a good effect is to be obtained, he must be taught that a proper effect is to be got not from rapidity but from good aiming. If, in addition to this, he be trained to be calm, and to understand the difficulty of replacing ammunition during a fight, he will undoubtedly learn to be careful in expending his cartridges.

Having dealt with the question of fire discipline, I will now describe the various systems of ammunition supply.

The Prussian soldier with the new equipment carries 100 rounds on his person instead of 80 as formerly. It is intended to introduce company ammunition wagons to be drawn by two horses; but at present the greater part of the infantry have the battalion ammunition wagons drawn by six horses, which contain 19,200 rounds, or about 20 per man. In addition to this, each company baggage wagon contains 2,880 cartridges, so that altogether the soldier has with him—

On his person	100	rounds.
Battalion ammunition wagon....	20	,,
Company baggage wagon	12	,,
Total	132	,,

The four ammunition columns have each 24 wagons similar to the battalion ammunition wagons, and carry under the latest regulations 65 rounds per man, making a total for each infantry soldier present in an army corps, of 197 cartridges.

Before an action is commenced, the ammunition wagons of a regiment or brigade are as a rule united together under a mounted Officer in a secure position, about 900 yards behind the fighting troops. In case of need they must be taken up to the fighting line regardless of loss. The cartridges are to be taken from the ammunition wagons to the front by men from each company, and supports sent in to the fighting line should take with them cartridges for those already engaged. Both Officers and men must on every occasion remember to complete the ammunition supply, and that without any reference to the regulation number of rounds to be carried in the pouches, any extra supply brought forward being disposed of in

the havresacks or pockets of the men. Cartridges should be taken from the wounded and dead. If the ammunition wagons cannot accompany the men, additional supplies must be served out before the fighting commences.

On the defensive, especially in a prepared position, ammunition boxes should be placed in the firing line, or cartridges may be stored in casks placed there for the purpose.

As soon as the fight is over, the men's ammunition must be completed either from the company or battalion wagons, and the latter must be filled up from the ammunition columns.

The French Regulations for ammunition supply are much the same as the German. The French infantry soldier, armed with either of the large-bore pattern rifles,[1] carries on his person 78 rounds. Each battalion has an ammunition wagon, drawn by four horses, which carries an additional supply of 18 cartridges per man, while 2 rounds per man are stored in the company wagons. Each man, therefore, in the battalion has available 98 rounds. In addition to these the two infantry ammunition columns of an army corps carry a reserve supply of 46 rounds per man, and the park of the army corps[2] carries an additional 33 rounds. The total number of cartridges per man in the French Army Corps is only, therefore, about 177, as compared with 197 in the Prussian Corps.

On the field of battle the battalion ammunition wagons of a regiment are as a rule grouped together in as safe a position as possible, not more than 1,100 yards from the fighting line, less if the ground be favourable. In critical circumstances they may be ordered right up into the front; their position by day is indicated by a yellow flag, by night by a lantern of the same colour. The cartridges should be collected from the dead and wounded and distributed among those fighting. Before reinforcements are sent into the shooting line, the men should have one or more packets of cartridges served out to them, and every opportunity of replacing the cartridges consumed should be taken advantage of during pauses in the fight. No man must be sent back from the fighting line for the purpose of bringing up ammunition. Cartridge bearers must be furnished from the companies in reserve. They are provided with double havresacks kept in the ammunition wagons, and which are capable of holding about 60 packets of cartridges, *i.e.*, 360 rounds, weighing 37 lbs. 6 ozs. Having carried the ammunition to the fighting line and distributed it, the bearers return for more. On the defensive, a supply of cartridges should be ready at hand for the firing line, and the ammunition wagons even may be brought up close to it, if they can be sheltered from the enemy's fire.

The Austrian Regulations for ammunition supply have lately been considerably modified. The number of cartridges carried by the men

[1] I am unable to give any details of the new arrangement consequent on the introduction of the Lebel rifle.

[2] I do not take into consideration, in dealing with the German Regulations, the supplies carried in the parks (Feld-Munitions-Parks), which carry about 12 rounds per man, because these are not immediately available in battle.

has been raised from 70 to 100 rounds. The battalion wagons have been replaced by company wagons drawn by two horses, and containing 7,000 cartridges. The Divisional ammunition column supply has been increased, as also has that carried by the parks in rear, so that the soldier armed with the 11 mm. rifle has available—

On his person	100 rounds.
In the company ammunition wagons	35 ,,
In the Divisional reserves	48 ,,
Total....	183 ,,

The ammunition wagons of a battalion are as a rule kept together. They follow the battalion reserve in an attack as closely as possible, but making the best use of the ground, and keeping as much as possible out of reach of the projectiles fired at the troops in front. When the whole battalion is in the fighting line, the wagons keep as close to it as the available cover permits. When under artillery fire they should be kept 20 paces apart.

The position of the ammunition wagons is marked by a red flag by day and by a green lantern at night. These indications should not be visible to the enemy.

When fighting is expected the men should have twenty rounds additional served out to them. As soon as the combat commences, the companies in the fighting line send six to eight men (bandsmen or pioneers when possible) under the command of a non-commissioned officer to the ammunition wagons. Each man is there provided with a havresack containing 300—400 cartridges, and the whole return under the command of their leader to their companies. It is the duty of the battalion commander to see that any further supply that may be needed is furnished. As a rule, it will be taken by the reinforcements going into the fighting line, or by men from the reserve under the command of a non-commissioned officer. These will remain at the front and not come back.

Cartridges should be taken from the dead and wounded, and the pioneers during a fight should be utilized to replace ammunition which has been expended, and to equalize among the men the supplies they have.

On the defensive the wagons may be emptied of their contents, which may be distributed among the men, or placed at certain points along the line for distribution.

From the facts I have laid before you this afternoon it will be plainly seen how much stress is laid by foreign nations on the preparation of their men for the difficult *rôle* of modern fighting. I have chosen the three principal military nations for my purpose, though I might have added others. Italy and Belgium both have systems directed to the same end, the ordered control of the men in the fighting line.[1]

[1] In both the Belgian and the Italian Armies the subdivision of the fighting line is more minute than in others; it would, however, be beyond the scope of this lecture to deal with this matter in detail.

Indeed, the field exercises of these two nations are particularly worthy of notice, as they represent the earliest and the latest endeavours in this direction. These endeavours all point to one control over the fighting line by its division into units capable of being influenced by one man.

In the Prussian Army the unit on which the regulations are based is the *zug* (section or third part of a company), the war strength of which may be assumed to be about sixty to eighty men. In the French Army the section or fourth part of a company is the unit, but this is divided up into half-sections and squads, the latter numbering twelve to fifteen men. In the Austrian Regulations the use of the company is based more upon a lower unit, *i.e.*, the *schwarm*, and in both the Austrian and French methods, considerable stress is laid on keeping the smallest units together so as to avoid confusion and facilitate command.

When General (then Colonel) Bronsart von Schellendorf wrote his reply to the well-known pamphlet of the late Captain May, he stated as one of many objections to the author's suggestions, that he wished to sweep away all ranks between General and Lieutenant; do not these regulations which I have described to you to-day point in this very direction? More in the direction that May really meant. That is to say, it is becoming more and more acknowledged every day that infantry fighting is a matter of small units intelligently led, all directed to a common end, mutually supporting one another, but in themselves of such a size that one man can lead them. This work naturally devolves on the lower ranks of Officers. The higher ranks, therefore, under the present conditions of fighting cannot have the same influence as they had when men moved in close formations. To lead men under fire was always difficult. The difficulty has enormously increased of late years, owing to the complete disintegration of the larger units which takes place owing to the murderous nature of modern fire. To meet it at all successfully we must arrange for a proper division of the fighting line into units manageable by one man. We must arrange for the replacing of this man should he and his successors one after another be shot. We must see that the men in these units are trained to keep together, both for mutual support and to facilitate reinforcement, and last of all, though by no means least of all, we must train the men so that while obeying implicitly their leaders so long as they have any, they may, when all these have gone down before the enemy's fire, still know how to act together to gain the object of the fight.

All this means training, and no mere description of the dry regulations can give you an idea of how these principles are inculcated in peace practice. To learn this, you must go, if you wish to learn the Prussian system, to Germany, and there watch the careful training of the men to this end. Then when you have seen and appreciated how long and careful it is, go to the battle-fields of the last war and see by careful study on the ground how these principles have been applied in practice. I am afraid that to some in England such an education would prove a rough awakening from dreams of unrealities

in which they have indulged. But better far that this should be the case than that those dreams should be dispelled in actual warfare at the cost of blood, and it may be disaster.

In conclusion, I would draw your attention to the increased ammunition supply which both Prussia and Austria have already given to their men. These supplies will be considerably augmented when the new small-bore rifles are introduced. We shall see in the next European war, not perhaps a reckless expenditure of ammunition such as was indulged in by the Turks in 1878–79, but we shall see a great deal more infantry firing than we have hitherto seen. Men *will* fire when they suffer loss from the enemy, and with the long ranges now available fire will be opened earlier, and more ammunition will be required than under former short range conditions. To conduct fighting nowadays, to see that ammunition is properly expended, and to keep up a proper supply will be no light task; far harder will it be, far more scientific, if I may use the term, than fighting under the old conditions. But the new departure should present nothing difficult to the British Army if it will but remain true to the old guiding lines. It was superiority of fire which gained the reputation of English bowmen, it was superiority of fire by which Wellington beat the French at the beginning of this century. If the national aptitude for shooting be carefully trained we can hold our own under the new conditions. But it must be trained, and training is not to be got on the barrack square, but by careful practising in peace the tasks that fall to the soldier in war, under conditions which represent, in everything but loss of life, the actual realities of modern fighting.

APPENDIX.

WHILE this lecture was in course of preparation, the introduction of the Lebel rifle into the French Army brought about changes in the regulations for the use of the infantry weapon which modify to some extent those hitherto in force and which I have given in the body of the lecture.

The Lebel rifle has a calibre of ·315 in. and weighs 8 lbs. 12 ozs. The barrel is rifled with four grooves double the width of the lands, having a twist of 1 in 27½ cals. The cartridge is in shape similar to Hebler's, described in my lecture on Magazine and Repeating Rifles. (See Pl. 5, vol. xxxi, p. 135, Journal of the Institution.) The muzzle velocity is said to be 2,280 ft. secs. The trajectory is exceedingly flat, the 400 m. sight serving to cover the ground up to 600 m. The rifle is sighted up to 2,000 m. Up to 800 m. the flap is not turned up, the elevation being obtained by pulling the slide up the flap until it rests on the step of the bed graduated for the required range. The right side of the leaf is graduated in 100 m., the left in 50 m.

The magazine holds eight cartridges and is placed under the barrel as in the Kropatschek. It can be "cut off" when not required. The breech action is believed to resemble the Gras, except that the bolt when home grips on both sides of the bolt-chamber.

The chief changes in the regulations for the use of the rifle are as follows:—*Close* ranges are now extended to 660 yards; *moderate* ranges are included between 660 and 1,320 yards, while all over the latter distance are *long* ranges. Fire is to be conducted by groups not exceeding a section

(*peloton*). On the offensive fire should only be opened when it will be efficacious, and care should be taken to proportion the expenditure of ammunition to the object to be gained. On the defensive fire may be opened as soon as the enemy becomes vulnerable. Its rapidity should be proportionate to the ammunition available, and when the supply of cartridges permits, it may be as intense as possible from the first. The various kinds of fire are, *volleys, independent fire, rapid fire, attack fire, and magazine fire.*

Volleys may consist of one round only, or the magazine may be used, especially if the object be visible only for a short time. They may be made use of at *moderate* ranges, they can rarely be used at *close* ranges, independent fire will then usually be employed. Magazine volleys may be fired at suitable objects visible only for a short time at *long* ranges, *i.e.*, over 1,320 yards.

Independent fire is used at *moderate* and *close* ranges, and is conducted as in the English service, but the number of rounds is never specified, the soldier continuing to fire till ordered to stop. Unless the nature of the case render it desirable for the whole line to fire, the best shots of each group only should do so.

Rapid fire, either from the magazine or shot by shot, is confined chiefly to *close* ranges or against very vulnerable targets at greater distances. It is the quickest rate of independent fire possible when the rifle is used as a single-loader. The soldier should be able to fire twelve rounds in a minute.

Attack fire is independent fire delivered while moving forward, and is only to be made use of during the last period of the attack. The men will at first use the magazine and when that is empty continue the fire, using the rifle as a single-loader. The 400 m. sight is always to be employed, and the bayonet must be fixed as soon as this nature of fire is ordered.

Magazine fire is only to be delivered by command, but is not necessarily confined to any one stage of the fight. It may be employed in combination with rapid fire or volleys. When firing volleys the soldier should be able to empty the magazine in forty seconds, or in thirty, when firing rapidly.

The foot of the target is always to be aimed at. Two sights may be used when the distance cannot be judged with certainty within 200 m.—W. H. J., 24th September, 1888.

Colonel Sir LUMLEY GRAHAM, Bart.: Captain James has done very good service in pressing upon us the necessity of fire discipline. It is a necessity that has been over and over again impressed upon us, and it cannot be too often impressed. He has given us an account of the view that different Continental armies take of the infantry fight, and how it is to be conducted. I do not think he has said much about the preparation of the soldier for that ordeal, but all foreign armies take the greatest possible pains with the preparation of their soldiers to fight, and above all that Prussian army to which he devoted a great deal of his lecture. He told us it was necessary for us to go to Germany to acquaint ourselves with the mode in which soldiers should be trained, but it is not open to all of us to go to Germany or Prussia to see how the soldier is trained. He has had that advantage, I have no doubt. But we have a great many accounts in our language now of the way in which the German soldier is prepared for war. At the risk of being thought egotistical I will refer to a long account which I published in the Journal of this Institution as far back as the year 1881 or 1882:[1] a series of papers in which I described the views taken by different foreign armies of the action of infantry in war, and I also particularly enlarged on the training of the German soldier for that object. There was a long account, I remember, given in the paper of the practical training of the German soldier with a view to fire discipline, and I

[1] Journal, vol. xxx, Nos. 109 and 111.

should like to refer some of those present to those articles, as they may complement Captain James's lecture. Discipline of course is the first thing that the soldier has to learn, discipline in the large sense, before we come to fire discipline, because fire discipline after all is only an application of discipline in the large sense to one particular object. How discipline is to be taught and from what discipline proceeds is a very large subject indeed. I am not going to enter into that. To begin with, the time would not be sufficient, and also it is to be the subject of the essay for the Prize Medal of this Institution this year. The subject of the essay will include no doubt fire discipline. Fire discipline is a branch of discipline, and a very important one, of its own. The very word "fire discipline" has been introduced by that nation which has learnt to carry it out to the utmost—the German nation, and every other nation has borrowed that word. Fire discipline, like all other sorts of discipline, comes principally from the action of the Officer, and Officers cannot ensure good discipline of any sort unless they are thoroughly instructed in their profession. With regard to fire discipline especially, it requires a great amount of training both in Officers and men for it to exist in any shape, and a vast amount for it to exist in its most perfect shape. The Germans promote that fire discipline to a very large extent by a great amount of what we call field firing—of what they call firing representing battle ("gefechtmässiges schiessen"). We carry that out to a certain extent, I am happy to know, but I think there is one very important sort of training leading to it which we at present have neglected, I mean the company field firing. Every German company, before it is allowed to practise field firing with the battalion, or afterwards with the brigade, has to undergo a course of field firing under its Captain. The Captain, as we all know, in the German Army is the great instructor of his men, and the more we can make the Captain in our army the great instructor of his men the better. That very system which Captain James has so well described of the devolution of authority from the highest, dividing the authority among all the subaltern Officers, and even the non-commissioned officers, down to those of the lowest grade, so as to make the direction and control of men in battle possible under the present conditions of warfare, that is only arrived at by the most careful training, and a great deal of that training is given in that very field firing that I am talking of. Anyone that does me the honour to read these papers that I have already alluded to, published in the Journal of the Institution, will see a long description of the way in which the field firing is carried out in the German Army, always with a tactical idea in view, so as to assimilate circumstances as far as possible to those of the battle-field. When this course of training has been carried out steadily in a systematic way, every Officer, every non-commissioned officer, and every man knows his place in his company and battalion, and we can quite understand that when they come to actual warfare they feel much more at home than troops which have not had that sort of training. Therefore I hope that that training will be carried to a very much greater extent than it has been hitherto carried in our army. There is another way, I think, in which the training of troops for fighting and for making good use of their arms will be very much stimulated, and that is by inspection in field firing. At present, if I am not mistaken, inspection in firing with ball is never carried out by a General Officer in our army, except in India, where it is done. But it would be a very important improvement to introduce, that the General Officer should devote less time to some of the parts of military training which are of minor importance, and devote a great deal to that very important part of it, the shooting of the men, and not only their shooting at targets, but their shooting as it were in action, in what is the nearest approach to the conditions of the battle-field. I can quite imagine that any Officer in our Service (I am sure it would be so in my case) if taken to the battle-field without ever having had an opportunity of leading men against the fearful arms now in use, would be very much at a loss how to direct his men to make the best use of their arms, and to assume the best formations for attaining his object. But if he had the long course of practical training which is given to the German Officer and soldier, he would feel very much more confidence in himself, and I think it is only fair that our Officers, the greater part of whom are perfectly fit to do any duty that they are called upon to perform, it is only fair to them that they should have that opportunity of learning

their work thoroughly, which other armies, and especially the German Army, enjoy. I hope some Officers who have seen some of the more recent fighting will give us their experience of fire discipline.[1]

Captain WISELY, R.E.: I must apologize for taking part in the debate, but my object is to make a very few remarks on Captain James's paper rather with a view of supplementing what he said about the French Army than of discussing the subject of his lecture generally. With your permission, Sir, I will refer to a few notes I made before coming in, which I would have had great pleasure in forwarding to Captain James if I had seen the lecture earlier in proof. I presume the French Regulations quoted by Captain James were those of 29th July, 1884, which have been in use up to May of this year. New regulations were issued on the 3rd May last. Fring by three rounds at a time is abolished, and the different sorts of fire are now:—Independent fire (*à volonté*), rapid fire, repeating (or magazine) fire, volley fire and attack fire (or "fire on the march"). *On the offensive*, the firing begins at about 800 metres distance,[2] and is carried on independently (*à volonté*) up to 500 metres. Between 500 and 350 metres "magazine fire" and "rapid fire" are employed, then immediately the order is given to advance and to commence "attack fire," *i.e.*, "firing on the march." At 100 metres, the troops cease firing, charge and assault. *On the defensive*, fire commences when the enemy appears at between 1,000 and 900 metres. It is continued by volleys and independently (*à volonté*) till the enemy is at 400 metres. Rapid fire by successive shots is then made use of. Magazine fire is reserved for the moment of the assault. These regulations give quite a new feature in fire tactics, as far as I am aware, that is, firing on the march. The regulations are for the use of the Lebel rifle, M. 1886, and, with regard to the amount of ammunition carried, from notes which have appeared in the French newspapers at different times, it would appear that about 108 rounds are carried on the person by the infantry soldier, and this amount of ammunition weighs considerably less than that carried hitherto by the French soldier.

Major GUNTER: I would ask the lecturer if he can give us any information as to whether it is intended to introduce any bandoleer pouches. This is a small matter, but from late experience in practising skirmishing with our own men, I found that the cartridges almost always tumble out of the pouches when they run forward; and the men keep on stopping to pick them up. They will do it, they would do it in action. The result is, you cannot get the men to go forward in a line together. I think the attention of the authorities ought to be directed to the defective nature of our pouches. It has been often suggested that bandoleer pouches worn over the shoulder would be a great improvement for carrying ammunition in the field, which of course is of great importance. Sir Lumley Graham stated that no company field firing is carried on by the British regiments. I think Sir Lumley cannot be acquainted with our present regulations. We do carry on company field firing under the recent regulations, and before we go to battalion field firing, where there are ranges available. The great difficulty in England is the question of rifle ranges. Until proper rifle ranges are provided for troops, practical effectual field training cannot be carried on. That is of course a question of expense. In India, the field firing practice is carried on in the most thorough and efficient manner, both by companies and on a large scale. I have had the advantage of seeing the Germans at their field firing; and I can only say that where good ranges are available, our practice of field firing is in no way inferior to that of the Germans. With regard to the General Officers, I may say General Officers now do personally attend at the field firing practice and long-range practice, and moreover, the annual training of the regiment is carried on under the direction of the General Officer commanding

---

[1] I was very glad to hear from Major Gunter, who spoke after me, that instruction in field firing is now carried out much more completely in this country than I had supposed. Still Major Gunter admits that it would be more complete if there were a sufficiency of good ranges, which is unhappily far from being the case.—L. G.

[2] These distances are defined for instructional purposes on level and open ground.

a district. The Commanding Officers submit to him the practice they intend to carry on year by year.

Sir LUMLEY GRAHAM: Does the General Officer make it part of his annual inspection?

Major GUNTER: He goes down at different times. The General Officer also causes the regiments to carry out the regular field firing practice. The General Officer has so many rounds at his disposal for the purpose of carrying out experimental fire tactics.

Sir LUMLEY GRAHAM: Then there has been very great progress made. You must allow for my ignorance as an old soldier.

Major WALTER SMITH, R.A., D.A.A.G. for Instruction: It is a very great satisfaction to me, Sir, to find Captain James dealing with a subject from an absolutely independent point of view, yet arriving at identically the same conclusion which I had myself reached when I was approaching a distinct topic in this theatre not very long ago.[1] It is also the point from which he draws the principal moral of his paper, namely, the division of the fire-line into semi-independent groups, each under its own leader. It seems to me a matter of very small importance what you call them, whether "züge" or "sections," or anything else; but the crucial point is to break up the fire-line into groups, each under a leader with his own sphere of responsibility and command. As far as the attack has been carried on in our Service till within the last year certainly, responsibility as regards minor fractions absolutely lapses directly troops take up their most important *rôle*, namely, the fighting formation for the attack. In the paper I then read (a point which I may be perhaps allowed to advert to because you can hardly drive a useful nail home too firmly), there were one or two detailed features by which I endeavoured to give extra independence and to define in a more marked manner than previously those sections in the fire-line. One was that to each of the four men who were, under my proposal, to form the two flank files of sections, I gave distinctive badges, a feature which might prove very helpful for "rallying" and other purposes. The Prussians endeavour to separate their groups one from the other by allowing certain intervals between them; and as far as I understand the recent instructions in our own Field Regulations the same principle is embodied. I think, however, that these intervals will very likely disappear in the stress of actual fighting; and as it is all-important to keep the sections as distinct as possible I suggest that distinctive badges should be put on the outside arms of the flank men. These flank men would be only second in importance to the two non-commissioned officers who had the section; and in the event of casualties carrying away the two leaders these flank men (who would be respected as men always are who hold recognized posts of responsibility) would naturally step into their shoes. Now it seems to me it is not for the purpose of fire discipline alone, although that is no doubt the primary consideration, but on other occasions as well, that this independence of sections becomes a matter of very considerable importance. When a sudden counter-attack has to be met, and you want to throw the troops rapidly into some other formation for receiving the blow, or for rallying the men after a successful assault, or for the chance encounter at close quarters, it is of the utmost importance that there should be some one official responsible for collecting around himself as a nucleus, and subsequently directing, each particular group of men. Then, as regards fire discipline itself, this becomes much more easy when the men have been accustomed to receive orders habitually from the same Officer or non-commissioned officer in quarters as well as in the field. In fact, I advocate that this demarcation, separating off specific sections from each other, ought to be introduced more consistently than it now is into the daily life in camp or in barracks; in other words, that administrative independence should be accorded more and more decisively to them. The non-commissioned officer in charge should be the channel of responsibility and command on all points in quarters, and in that way you would establish a sort of family feeling in the group which would be of exceeding value whenever questions of discipline, of field efficiency, or of sudden emergency were at issue.

---

[1] "The Mechanism of the Counter-Attack," see Journal, No. 144.

The subdivision of a field battery under the command of its No. 1 will furnish a nearly exact analogy.

Colonel STERLING (on being called upon by name by the Chairman): Having but just arrived, I am not prepared to give a detailed answer to this very skilful paper of Captain James, for which I am personally very much obliged to him. But there are some remarks which have been made in the discussion, about which I have a contrary opinion. In the first place we must remember that the "zug" of the German company is about the size of one of our companies, and if you divide that and have a divided authority further down, you will get to a very small unit at last. I might further say, from some practical experience of the training of soldiers, there is not the slightest difficulty in keeping sections clear for field firing by the present arrangement which is allowed us by the drill-book. I have done it repeatedly in field firing, and find there is not the slightest difficulty; it is a mere question of training your men originally. You do not want "badges" for flank men, in my opinion. You will not be likely to have a section commanded by less than a sergeant, and you have your corporals and your lance-corporals for flank men, if considered advisable, but of that I have grave doubts. Your badges would lead to confusion if there were losses, and you would have to mix the men eventually. In fact, the remarks of the Officer on the opposite side have been rather hypercritical, if you will allow me to say so. As regards attack by sections in the field, I have seen it done in defence, and then it was thoroughly efficient. On one occasion I was practically in command of two non-homogeneous bodies on service when the attack took place. One body fired rather wildly; I had to sound "cease firing" altogether, because one body was firing the wrong way, which was awkward for people on our own side. The other day it was under my own personal command that field firing by sections was carried out, and there was not the slightest difficulty. I do not think that with troops trained in the same way you would find any more difficulty in the attack than I did on service in defending, and I think it is a mere question of training in peace. I most cordially endorse what Captain James has said, that you must carry out in your practice-training in peace-time, what you intend to do in the field. Under the present short enlistment system I do not think you can have a great many diverse ways of carrying out this important practice. I have lately been commanding, as Brigadier, six, seven, or eight different regiments; every one of them has a different way of firing, and every one of them has a different way of attacking. That does not meet my views. Of course every man thinks he is right and the others are wrong; *cela va sans dire*; but the other commanders equally take their own opinion. I may congratulate Captain James on his position in having been able to speak as strongly as he has done, which perhaps some of us cannot do.

The CHAIRMAN (General Clive): This lecture is headed "Fire Discipline and the Supply of Ammunition in the Field as provided for by Foreign Powers." I take leave to say that as far as I am personally concerned I have been thoroughly aware of our shortcomings in this matter for a long time. Eight years ago, I had the honour of giving two lectures in this Institution on Tactics and the Supply of Ammunition to Troops in the Field,[1] and I am very much obliged to Captain James for renewing the subject, because I think it is the advantage of this Institution that if we only speak loud enough and often enough, by degrees we shall get more attention paid to our shortcomings. The subject is, moreover, far more important now when we are introducing magazine rifles, and shall expend our ammunition far quicker. My difficulty is the physical one how in the heat of action to transfer rounds of ammunition from the S.A.A. carts to the troops in the fighting line. It is impossible to take troops out of the fighting line: this is conceded. Such troops, whether their pouches are empty or full, must advance with those sent to reinforce them, or as it is now expressed, to carry them forward: there is no stopping when you get near the enemy. I was hoping that Captain James would have made some suggestions by which this physical difficulty could be overcome: some system of distribution, which could be practised and tested, and if satisfactory, ordered. Captain James probably thinks that it is more our business to suggest these systems than his; he

[1] See Journal, vol. xxii, No. 97, 1878.

is content to point out the difficulties, but he says it is for you Commanding Officers to devise some system by which you can supply your troops with ammunition. Gentlemen, the first condition to ensure troops keeping ammunition in their pouches is to keep their heads cool, and that can only be done by training, *i.e.*, fire discipline. It has happened on service that Officers, so far from keeping the heads of their men cool, have excited them, and the result of this course must be a waste of ammunition, which, if no fresh cartridges are supplied, will result in those troops being defeated if the attack be prolonged. The first point is so to train the men to keep their heads cool, that they only fire when they can hit their mark. If a man only fires when he is certain of hitting, and if every man can be trained up to that point, I do not think it will be possible for any enemy to come near a line of infantry on the defensive. But when you have so trained troops, you must nevertheless have some system of refilling their pouches. We know that a small-arm ammunition cart is supposed to be in rear, but nobody knows where. The brigade may be deployed over a long front, and some battalion wants ammunition, but where the S.A.A. cart is nobody knows. The cart may be concealed behind a wood, or stuck in a bog—or unable to advance; the men are short of ammunition, nobody knows where to go to procure it, or if by good fortune the cart comes up to the rear of the line, you see about twenty men round it, and half the ammunition falls on the ground. There is no system. If we are to be prepared for war, there ought to be some system laid down by which the man in charge of S.A.A. cart is made responsible that it is at a certain place, or if not, that that fact is communicated to the troops. It should be somebody's duty to keep in view the cart on the one hand, and the troops on the other, and in each section or company someone should be told off to attend the cart and carry the ammunition back, so that the ammunition can be certainly transferred from the cart into the pouches of the men. That is the only way in which to meet the difficulty. Aldershot has been a camp of instruction for nearly thirty-three years, and every year the troops have occasionally run out of ammunition. The British soldier rather takes a pride in firing away the whole of his cartridges, and then lying on his face in the heather in the hope that he won't be sent any further away from his camp. Instead of that, the soldier ought under no consideration to fire his last cartridges. I should like to see an examination of the pouches ordered during pauses in the fight, when the "Cease Firing" was sounded, and every man with less than five rounds of ammunition in his pouch should be reported and punished. Soldiers would soon learn to husband their ammunition, and they would save their lives when they found themselves in action. Field days at Aldershot should be used for practising the troops in running out of ammunition, just to test their system of replacing it from the S.A.A. cart. For instance, serve out twenty rounds and keep the troops in action till thirty or fifty rounds have been fired, just to see how they are going to procure other ten or thirty rounds, and still leave some in their pouches. If that were done we could practise just as well with 25 as with 100 rounds, without extra expense by testing one battalion per brigade, or one brigade per Division at each field day. We spend time, trouble, and money in training soldiers, and in teaching them what I may call their various accomplishments. Discipline is of the greatest importance, so are education, drill, smartness, and rifle practice important, but the whole of these qualities, important as they are, will be found valueless if we send our men into action without providing some system by which they shall have ammunition enough to fire. I did not mean to delay you as long as this, because the opinions expressed have not been at all divergent. It is, in my opinion, most important to bring these things forward so as to secure efficiency in this vital matter.

Sir LUMLEY GRAHAM: When I was at Aldershot in 1867, we had an elaborate system of replenishing the pouches with ammunition. We did just what you said this moment should be done, we used to go out with from ten to twenty rounds, fire the whole of it away as fast as we could, and then there was a regular established system for renewing the supply. This was done by sending a certain number of men from each company with haversacks to the ammunition wagons drawn up in rear of the brigades, to fetch the cartridges which were then served out to the men in a very systematic way. I should like to ask what has become of this system, if we have not got any now. Has it been allowed to die away?

The CHAIRMAN: That is what I am asking for; there must be an absolute best way of doing everything, and I conceive it would not be very difficult to find out what is the best way of attaining this very simple object.

Sir LUMLEY GRAHAM: I thought there was an organized system in our Service.

The CHAIRMAN: There is a system; my complaint is, that it is not practised at field days to test its efficiency for service.

Colonel STERLING: May I say, as far as my experience goes, what they have generally used in the camps that I have seen, have been baggage animals, and there have been pioneers or some other people who have had to go and get the ammunition from the baggage animals.

Major GUNTER: It was laid down last year distinctly how to get ammunition.

The CHAIRMAN: What I want is to see it practised. Will Major Gunter assert that he has seen the system regularly practised and tested?

Captain JAMES: I do not think there is much for me to say in reply to the various remarks which have been made to my paper. Of course, as Sir Lumley Graham remarked, anybody who chooses can find a great deal of information in this country on the question of the individual training of the Prussian soldier. We have had two or three pamphlets translated and published in the Proceedings of this Institution. There are Sir Lumley Graham's papers on this subject, mine on musketry instruction and long-range fire, and that on the training of a company translated by Colonel East. There is also Baron Kaulbars' book which has been translated into French, and if you go to German there are a thousand books on the training of the soldier setting forth the various systems which different Officers think are the best way of training the men for taking their place in modern fighting. But what seems to me the great point in the Prussian Service and their system of training, is first of all that there is no rigidly defined system laid down. The result is looked to, and the trainer has to act according to his own lights. If he does not get the required result he feels the consequence, and if he gets it he may get it in the way he thinks best. We have nothing of this sort in England, there are a few books which deal with the question of individual training, and there are certain regulations for the tactical training of the company. I am in a position, which I daresay many of you know, where I see Officers of all regiments, and I am always a person who asks questions, and I have collected the evidence of thirty-seven Officers on the question of the tactical training of companies as at present carried out, and I am sorry to say that the general consensus of opinion is that the training, as at present carried out, is scarcely of a practical nature. I have not the documents with me to-day, but I can give you a few examples. They say, "We have a certain amount to do of field work, but my doing field work consists in marking out in the barrack square shelter trenches." Nearly the whole thirty-seven combine in the one point that the portion of the instruction which is devoted to company drill is perfectly useless. It is about as wise as the spring drills which are the bane of everybody who has arrived at a certain age in the British Army. Captain Wisely alluded to the French Regulations recently issued. That deals with the Lebel rifle, and as I was not able to put the thing completely before you, I did not enter into it.[1] I will give a *précis* of this new instruction in the points that differ from the instruction of last year, and put it at the end of the paper. Major Gunter asked if I knew whether any nations were using bandoleers for cartridges. I do not think any of them are. The Circassians in the Russian Service use pouches across the front, but there is no bandoleer, and I must say from my own experience, I should hope that the English will not adopt them. If they were used with the Boxer cartridge, the cartridges would soon be spoilt, because they would get knocked out of all shape; and even with the solid-drawn cartridge, if the belts are carried day after day, taken off and thrown on the ground, the bullet in the cartridge is very apt to get loosened, and they are very likely to be deformed, therefore, I do not think the bandoleer is a good way of carrying the cartridge. I have here a case which was

[1] The first two parts of the new French Infantry Exercise, viz., the *École du Soldat* and the *École de Compagnie*, were published about the time the greater part of this lecture was in print; the *École de Bataillon* was not issued till after the lecture was delivered.

exhibited some time ago, in which the cartridges are put in separate compartments. The Austrians have a pouch very similar to this; it is divided into two halves, the outer row of cartridges being lower down, and there is not the same accurate division. With regard to what Major Smith said as to the division of the firing line, I drew attention to this subject seven years ago in a lecture on "Modern Fire, its Influence on Armament, Training and Tactics."[1] I said then what I say now, that the only point that you can definitely lay down is the division of the fighting line into fighting units, the fighting unit being the number of men one leader can influence in the circumstances of close fighting. I do not think myself I should agree with him as to the distinctive badge for the flank men of sections or smaller units, because I do not quite see if the enemy unfortunately kills your badgemen what use the badges will be to you; I think the same remark applies to him as to the system of infantry attack, which is advocated by a very well-known legal gentleman. It seems to me, the great objection to his system of attack is this, that if the enemy does not play fair and does not knock off the men that he ought to do there would be just as much confusion with that as there would be with any other system of tactics. I am very glad that Colonel Sterling agrees with me in what I say, and I must say he has hit upon a point to which attention should certainly be drawn in England, and that is the varied systems of doing things. For instance, we have had changes lately in the field exercises, changes which have been long called for, and which I do not think are very radical in their nature. I was not present myself, but some friends of mine were, at a very distinguished parade a little time ago, and I heard, on very good authority, that instead of the troops forming into line they still wheeled into line as of old. I confess I was very much struck by it, seeing that this was done in the presence of the Commander-in-Chief of the British Army. Now I am not an advocate of everything German because it is German; it is quite ridiculous to take the systems which apply to one nation and apply them to another nation where the conditions are totally different; but still there is a great deal to learn from the German Army. The German Army is the growth of eighty years' constant attention, and we may fairly say, therefore, when we see that they adopt certain broad principles that these are right principles for an army to adopt. Now they have a system which ensures uniformity of instruction. I allude to the training battalion near Berlin, where detachments from all regiments are sent in order that they shall learn the methods of instruction and details of drill on exactly a similar plan, and take these back to their regiments to carry them out there. I think if we had something of the sort in England it would be very valuable. I was very much astonished some time ago to see in the papers, with regard to that peculiar product, the Enfield-Martini rifle, a question was asked what was to be done with it, "we had 100,000 barrels, and whether they were of any use at all?" The reply was most indignant, "They were extremely useful, they could be bored up again and used for Martini-Henry rifles." But I see since then that another use has been found for them. I am extremely pleased to find in these days, when uniformity of ammunition supply is admitted by everyone, that we have just introduced into the British Service a new two-barrelled Gardner gun, which is to fire the Enfield-Martini ammunition, that is to say, we are going to introduce a small-bore rifle—we have already the ·450 bore rifle—we are going to introduce a small-bore rifle, and we have deliberately introduced for land service purposes a two-barrelled Gardner with a ·4 bore, or thus involving three, ultimately two natures of rifle ammunition. I do not think any comment on such a proceeding is necessary, because the statement bears its own condemnation. I did not go into the question of the training of British troops because I considered I was barred by the terms of the invitation of the Council, and I had previously done it to a certain extent in the lecture to which I have alluded. In that lecture I proposed a system of ammunition supply which is almost identical with that adopted last year or the year before by the Horse Guards. And now with regard to the question of ammunition supply during a fight, to which General Clive alluded, I confess personally I have rather grave doubts whether you will ever supply ammunition during a modern fight, that is to say, I very much doubt whether when the men get to close quarters

[1] Journal, vol. xxiv, No. 106, 1880.

you will ever be able to send up ammunition to them. We are all apt to talk as if every one was able to keep his head when close fighting is going on. But I venture to doubt whether the ordinary soldier does keep his head when Dick, Tom, and Harry are going down right and left of him; bringing up ammunition from the rear involves a great deal of keeping the head. Therefore I am a little inclined to doubt when the fighting comes rather close, within 400 or 500 yards, whether you will ever be able to supply ammunition from the rear. It is very well in theory and very pretty at Aldershot, but when we come to the actual fighting of modern infantry I am very much inclined to doubt whether you will be able to supply ammunition except at the initial stages of the fighting or during pauses. The greater reason therefore to have fire discipline, and to see that the men have sufficient ammunition to start with, before the fight. That is very well done in the Austrian Service, where the men before going into action are supplied with an additional twenty rounds, and something of that sort might be adopted here. I have to thank you all for your attention; the subject is rather a dry one for a lecture, but for that you must blame not me, but the Council of this Institution, who asked me to take up the subject.

The CHAIRMAN: Ladies and gentlemen, I will ask you to allow me to be your intermediary in proposing a vote of thanks to Captain James for his lecture.

Friday, June 29, 1888.

ADMIRAL SIR EDWARD G. FANSHAWE, G.C.B., Vice-President, in the Chair.

ON FAST CRUIZERS.

By Sir EDWARD J. REED, K.C.B., F.R.S., M.P.

ON the 26th of November, 1884, I had the honour of reading a paper at this Institution, by the request of its Council, in which I gave the best answer in my power to the question put to me by the Council, viz., "What are the most urgent measures that should be taken for increasing Her Majesty's Navy?"

Although the subject for to-day's discussion is of a much more limited character, it may perhaps be well for me to mention on my way to it that there is great cause, I think, for congratulation in this Institution upon the consequences of the 1884 discussion in some important respects.

One instance may be found in the total change that has come over the administration of the Admiralty and of the dockyards in respect of the time occupied in building ships. That delays in completion due to want of guns are just as great now as ever, I am well aware, and our consequent weakness, and even danger, which would be felt in the event of war is well known to those here assembled. But as regards the quick building and completion of new ships in Her Majesty's dockyards, the evils of which I complained at length in 1884 have been terminated, and so great is the improvement effected that those two fine ironclads, the "Nile" and "Trafalgar," are to be finished in 1889 and 1890 respectively, although commenced only in 1886. I am pleased to say that this improvement has not been attended by any additional expenditure of public money; on the contrary, the Committee of the House of Commons on Navy Estimates, which is now sitting (and at which I ought to be present at this moment), has received evidence which proves conclusively that the quicker construction of our ships is attended by the economization of our money to a very large extent. It is not usual, I believe, and it is not necessary, to pay compliments at these meetings to the Executive Government; but as a political opponent of the present Government I may perhaps be permitted to say that these beneficial results are very largely due to two successive Secretaries to the Admiralty serving under Lord George Hamilton, viz., Mr. Ritchie,

who introduced some of the reforms, and Mr. Forwood, who has introduced others, and has carried them all forward with uncommon ability and perseverance. To Mr. Elgar, the new Director of Dockyards, we owe the clever carrying out with technical skill and on business principles of the measures authorized by the Admiralty, and the initiation of others for further promoting efficiency and economy.

The "Nile" and "Trafalgar" are themselves examples of another great change effected since 1884—I mean the construction of real, trustworthy, armoured line-of-battle ships fit to engage the enemy anywhere and at any time, in lieu of the ships of the "Admiral" class and some others, the chief defence of which in battle must certainly be looked for elsewhere than in the partial strip of armour amidships rising but a few inches above the smooth-water's surface which alone has been allowed them. I do not say that I consider the "Nile" and "Trafalgar" the best possible ships; far from it. I could take exception to certain of their features if the necessity arose; but this is not the occasion for doing so, nor is it, in my opinion, at all desirable to cavil at and criticize minor defects in Her Majesty's ships, provided they are in the main rightly designed. It is only when great and dangerous errors are made and persisted in that it becomes us to arouse ourselves; and thankful am I that, at length, after years of contention and complaint, a stop has been put to the building of first-class armoured ships so-called, with the armour on their sides so amazingly restricted in extent, as to leave the whole structure, and all on board it, an easy prey to a few light, quick-firing guns.

A third subject upon which we may congratulate ourselves, I think, as a result following very quickly upon our discussion of 1884, is the construction of faster ships for Her Majesty's Navy than had ever before been designed. The progress in this respect has not been nearly so satisfactory, as will presently be seen, as in respect of the other points then advocated—quick ship-building, and the designing of our new ironclads with side-armour enough to defend them properly; but there is no room to doubt that the discussion in question furnished the general basis of Lord Northbrook's additional programme, and greatly stimulated the production of fast vessels. The mode of carrying out the programme has been far from satisfactory.

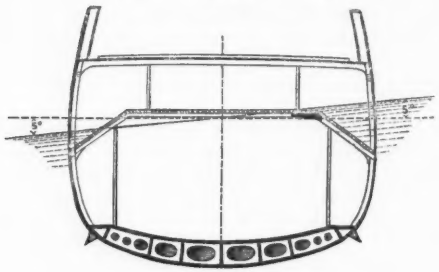
My primary object in writing this paper is to put a further check upon the laying down of cruizers of insufficient speed, and to give a new stimulus to the construction of swift ones. It will help to illustrate and further these objects if we briefly review what has happened in respect of cruizers since my former paper was read here.

Dealing with armoured cruizers first, it will be remembered that my advice to the Admiralty was to build forthwith five large armour-belted cruizers of 8,000 tons, steaming 19 to 20 knots, to be "supplied with abundant fuel," and costing 500,000*l.* each fully completed. These cruizers would have had thick belts, rising 4 feet above water all along the broad central parts of the ship to within 40 or 50 feet

of the stem and stern; they would have had 15,000 ind. horse-power, and a normal coal supply of 1,000 tons, with the power to carry an extra supply of 500 tons in presence of the enemy, or of 800 tons (giving 1,800 tons in all) when proceeding abroad and not requiring to give battle. These objects could have been fulfilled with the proposed vessels of 8,000 tons normal displacement, and costing 500,000*l.*

The Board of Admiralty decided to build five fast armour-belted cruizers, as recommended, but were advised to construct them of a kind very different indeed from that just described. They fixed upon 5,000 tons displacement instead of 8,000; a comparatively thin armour-belt; a belt so shallow that its total width was only $5\frac{1}{2}$ feet, of which 4 feet were to be under, and $1\frac{1}{2}$ feet above water; a speed of 17 knots; an indicated engine-power of 7,500; and a coal supply of 500 tons. They were to cost (or are costing), when armed, nearly 300,000*l.* each. On the very face of these figures it was manifest that the ships thus projected never would or could fulfil the object which I had proposed, which you had ardently supported in this hall, and which they were avowedly designed to fulfil. As soon as their intended character became known to me, I wrote to the "Times," and protested against their insufficient speed. The Admiralty then announced that they should be made $17\frac{1}{2}$-knot vessels. I again protested in the "Times," and a further concession was made; more powerful engines (of 8,500 indicated horse-power) were ordered for them, and a speed of 18 knots was secured, the coal supply being reduced to 440 tons. I need not trouble you with the whole story, for it is fully and most frankly recorded in the "Statement of the First Lord of the Admiralty explanatory of the Navy Estimates, 1887–88." The absurdity of giving to a fast armoured cruizer (which obviously needed a much larger supply of fuel than an ordinary armoured ship) a supply less in proportion to its indicated horse-power than had ever before been given in our Navy was apparent to the present Board, and they decided that to be of use as cruizers these vessels must be allowed to fill their bunkers (that had been made large for the purpose), and carry 900 tons of coal; and the net result of adopting so insufficient a design in the first instance was, in the language of Lord George Hamilton, this: "If the whole of the 900 tons, with the additional weights alluded to, be placed on board, instead of 440 tons, the top of the belt will be, on the ships first going to sea, 6 inches below the water." The five ships of this kind have been increased to seven in number, at an aggregate cost of over 2,000,000*l.*

FIG. 1.—Admiralty belted cruizers.



I need not ask any naval Officer, or indeed any man of common sense, whether the two millions sterling which have been expended on these vessels have been well expended. I venture to believe that in the discussion which is to follow the reading of this paper, not a single person will rise and say that the expenditure of the $2\frac{1}{2}$ millions which I proposed, upon five 8,000-ton 20-knot cruizers such as I described just now, would not have been vastly more valuable to the Navy than the expenditure which has in fact been incurred. It is true that the First Lord of the Admiralty, in the paper which I have quoted, tells us that "some persons claim" for the over-immersion of these ships "certain compensating advantages," and upon these I must briefly remark, for they are very remarkable.

The first is that there will be above the immersed armour-belt "a coal protection of $6\frac{1}{2}$ feet in height and of 11 to 17 feet in depth." But surely this is a new version of the "coal protection" doctrine. Hitherto we have been told that when armour protection could not be given to engines and boilers the protection of coal would be better than nothing, which is to a certain extent true. But this is a case in which the engines and boilers have already been protected by the armour-belt and thick deck, and that which has been left unprotected is the buoyancy, the power to float; and how on earth, or rather on sea, a ship's power to keep afloat when wounded under water, or at the water-line, is promoted by putting some hundreds of tons of coal in her, or by its being already there, is more than I can tell or can imagine. The First Lord must have taken this on trust, believing that, foolish as it seems, there must be some obscure reason for it. I must leave my hearers to judge whether the anonymous authors of this remarkable suggestion, which, as the Admiralty appear to accept and rely upon it, may lead to the sacrifice of several ships and many lives, deserve the trust reposed in them, or whether their names should not be given to the world as the authors of unheard of hydrostatic principles.

The second "compensating advantage" is that "the coal protection will not be disturbed until, by the consumption of coal in the lower bunkers, the ship had lightened, and the armour-belt had risen above

water." Reason and imagination alike fail me in attempting to put any honest meaning into these words. How can it conceivably be to the advantage of these long fine-line, not too stable, ships that the engineers shall, under all circumstances, be compelled to burn the coal out of the bunkers below before they disturb this huge mass of coal above the armour deck? The First Lord says of this coal that it runs along 140 feet of its length, for 6½ feet in height and from 11 to 17 feet in depth, say, of an average depth (measured transversely) of 14 feet. One such block of coal would weigh over 300 tons; blocks like this along both sides of the ship, which is probably what is meant, would weigh over 600 tons. Their centre of gravity would be high up, at least 3¼ feet above the load water-line, when the belt began to emerge. Without calculating the stability of these ships, which I have not had time to do, I decline to speak positively on the point; but I put it to nautical men, who know that these ships are 300 feet long and 56 broad, with 22½ feet draught of water, and with water-lines of almost unexampled fineness, whether it does not from the outside of the subject look as if it were rather dangerous treatment in a sea-way for such a ship, even in an uninjured condition, to insist upon the enormous top-heaviness which all this seems likely to imply. At any rate, it is contrary to all naval science and all sea experience to so build a ship as to force its Officers, as a means of securing safety in the presence of an enemy at sea, to leave several hundreds of tons of coal undisturbed high up above the water-line, and to take what they require from the lower bunkers alone. I will not put into language the humiliation which I feel, as a naval constructor, at having to witness and record such incredible things as part of the practice of the British Admiralty, and actually put forward by the highest authority, not as a matter fraught with danger, and to be deeply deplored, but as a "compensating advantage" for the loss of the above-water armour-belt.

The third "compensating advantage" which "some claim" is not the least curious of the three. It is "that a shot, which during a roll might have struck below the belt, would, in its present lower position, be deflected." This is perfectly intelligible, and stated with admirable candour. It means this: that this belt has been made so narrow that if you keep it up to its intended height above water, it may let shot and shell pass below it into the engines and boilers; and, therefore, when you have sunk the ship down until the whole of it goes under the water, so that she may be herself destroyed as easily as if she had no armour at all, then you get the compensating advantage of preserving the engines and boilers from attack below the belt!

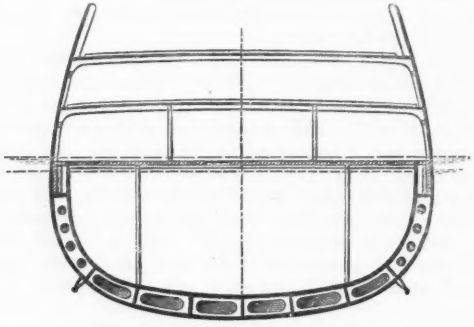
Such as they are, the seven vessels of this class appear to be the only belted cruizers which are to be allowed to the British Navy, unless the "Impérieuse" and "Warspite," which have undergone various changes of designation, as well as of character, are again to be known as cruizers. They first appeared before Parliament as "armoured cruizers" of 7,390 tons. They then appeared as barbette battle-ships, or something of that kind, of 8,400 tons, the increased

tonnage being obtained by the simple device of over-immersing them to the extent to which their partial armour-belt was intended to rise above water. The "Impérieuse" having left our shores with the top of her armour-belt just awash, she is deemed entitled to rank again with the belted vessels as a cruizer; and as an "armoured cruizer," and a "first class" one too, she, or rather her sister ship, the "Warspite," again appears in this year's Navy Estimates.

Finding no better results than the above ensuing from their repeated attempts to produce "belted cruizers," the Admiralty, not unnaturally perhaps, have decided to try no more, at any rate for the present, to produce anything so safe and serviceable. The 20-knot belted cruizers which I projected, and proposed to you in 1884, have not been built, and never are to be built, very fast belted ships being now deemed a luxury too great for the British Navy, and such as can only be allowed to other Powers to whom the combination of great speed and coal supply, with a fair amount of safety, is an object of more earnest pursuit than it is with us. Not a single armoured ship of any description, whether cruizer or battle-ship, has been laid down for the British Navy for more than two years past, and apparently none will ever be laid down again in this country until the public and the Naval Service take the matter into their own hands.

It is not surprising that men who consider it a compensating advantage to being certainly sunk in one way that you have not been destroyed in some other way, should get rid of armour altogether, and, having entirely abolished it, should tell you that they are building you "protected ships!" The "Blake" and the "Blenheim,"

FIG. 2.—Admiralty protected cruizers.



now to be built, are to be examples of this system; they are to be called "protected ships" precisely because, as ships, they will not possess any protection at all. Not a single inch of the surface of these two ships is to be protected even against machine-guns. What is to be protected is the space below a certain stout deck and its

contents, the said deck being itself several feet under water. The machinery and magazines will be protected against the fire of all guns of moderate power, and if the ship had been allowed the same advantage, all would have been well. But the ship itself, and its power to keep afloat, is not to be protected at all, so far as I know, certainly not by steel plating; and to my mind, at least, it is most extraordinary that men—any men, no matter who they are, or what offices they may hold—should be allowed, not only to deprive Her Majesty's ships of everything in the shape of protection, but then to parade them before us as "protected ships." Why the Navy itself does not demand the correction of this most misleading error I do not understand. Lloyd's officers have honourably refused to lend themselves to this, I see, in their invaluable "War Ships of the World." They designate this description of ship as "deck-protected cruizers," which, although not a wholly unobjectionable designation, is an honest attempt to describe them in a manner that shall not be dangerously misleading.

Before leaving this branch of my subject I should like to lay it down again clearly, that the sacrifice of side-armour protection involves nothing less than the sacrifice of the power to keep long afloat under the fire of light guns. Give a ship a belt of armour of proper length and depth, properly surmounted by a thick deck, and properly terminated, and she is perfectly safe against the fire of all guns that are unable to penetrate the armour-belt. Take away that belt, and substitute for it a low-sloping or curved protective deck, such as the "Blake" and "Blenheim" are I understand to have, and you at once offer her up as a victim to every description of shell-gun down to the smallest. It is upon the inviolability of that very triangle of buoyancy, so to speak, which you in this way sacrifice at the sides of the ship, that the stability and life of the ship depend; and to open this triangle up to the inroads of explosive shell and of the sea is to sacrifice her. I wish the Council of this Institution would take this matter up, investigate it for itself, and speak out its decision to the confusion of all who have attempted to mislead the Navy either way in this matter.

The question has been obscured by much idle writing, especially on the part of those who are either responsible for the deck-protected type in our own Navy, or who are engaged in building so-called war-ships for foreign navies, and who have no particular interest in the consequences, so long as they satisfy their customers. But the facts of the case are palpable, and incapable of permanent perversion. An armour-belt, of suitable depth, will keep out of the ship and away from her vital contents not only all those shells to which her armour is proof when struck square, but likewise all those still longer shells, which striking obliquely cannot penetrate it. In this way an armour-belt protects the floating power of the ship against all the quick-firing machine and other light guns at present afloat, and against many larger guns under ordinary conditions. In a ship with only a protecting deck over the machinery and magazines, on the contrary, all the shells of all these guns are received into the interior of the ship,

there to work any mischief of which by exploding they may be capable, and with the sea following in to occupy the space thus opened up to it. I say nothing of the "mélinite" shells, with which the French Navy is being supplied, and to which that truly gallant and patriotic young Officer, Lord Charles Beresford, has so persistently invited attention. I say nothing, for I feel that I need not say anything, as every Officer present must be aware that such explosive projectiles freely used would leave but little chance of existence to our armoured cruizers with their submerged belts, or to our deck-protected vessels which are in a still worse plight.

But although utterly unfit to fight a close action with a belted ship, and running many risks of destruction from raking and other fire, the "Blake" and "Blenheim," by virtue of their enormous speed, 22 knots, will be valuable additions to the Naval Service. I have not yet seen the design, but from what the First Lord of the Admiralty said of them in Parliament, they appear to resemble in a remarkable manner the vessel proposed by Sir William Pearce in 1883 or 1884, and rejected by the Admiralty Office in no very ceremonious manner. They come nearly four years after my proposal at this Institution, to build belted cruizers of 20 knots. It is, nevertheless, a satisfaction to know that at last we are to have two very fast ships, of some sort, to outstrip in speed the existing sea-going vessels of every other country.

I now wish to invite attention to the waste of public money, as I cannot but regard it, which has taken place, is taking place, and is in contemplation in the production of ships of insufficient speed. In and since the year 1880 we have built or brought to completion, in addition to many other ships, the following of which I give the names, the years of completion, the speed, and the total cost up to the 31st March, 1887.

Names.	Year of completion.	Utmost speed in knots.	Cost roughly stated.
			£
Carysfort	1880	12·9	148,000
Champion	,,	13·0	139,000
Curaçoa	,,	,,	150,000
Cleopatra	1881	,,	140,000
Constance	1882	13·7	161,000
Conquest	,,	13·0	141,000
Heroine	1883	,,	96,000
Satellite	,,	,,	93,000
Canada	1884	,,	170,000
Hyacinth	,,	,,	96,000
Rapid	1885	,,	95,000
Calliope	1886	13·75	190,000
Cordelia	,,	13·0	163,000
Caroline	,,	,,	106,000
Royalist	,,	,,	101,000
Calypso	,,	13·75	209,000
Espiègle	1882	11·5	97,000
Mutine	,,	12·0	95,000
Kingfisher	1884	11·6	76,000
Dolphin	1885	11·25	54,000
Mariner	,,	11·5	75,000
Wanderer	,,	11·25	52,000
Reindeer	,,	11·5	70,000
Racer	,,	,,	74,000
Acorn	1887	12·25	63,000
Icarus	,,	,,	72,000
Swallow	,,	13·5	80,000
Algerine	1881	10·5	57,000
Linnet	,,	11·8	43,000
Rambler	,,	10·75	60,000
Ranger	,,	11·0	48,000
Swift	,,	11·75	42,000
Banterer	1882	10·0	28,000
Bullfrog	,,	9·8	32,000
Grappler	,,	,,	26,600
Wrangler	,,	10·0	31,000
Espoir	1883	,,	27,000
Raven	,,	9·75	25,000
Starling	,,	,,	29,000
Stork	,,	,,	25,000
Cockchafer	,,	9·8	31,000
Albacore	1884	10·75	36,000
Mistletoe	1885	,,	36,000
Watchful	,,	,,	35,000
Bramble	1888	12·75	52,000
Lizard	,,	,,	56,000
Rattler	,,	,,	41,836
Wasp	,,	,,	39,857
		Total.....	3,807,293

Here we have nearly fifty vessels of war brought to completion in and since the year 1880, costing nearly 4,000,000*l.* sterling, and while not one of them attained even a measured-mile speed of 14 knots, thirty-two of them fell short of 13 knots; one-half of them fell short of 12 knots; and some of them as low as 9¾ knots. Naturally enough many of them are already condemned as useless for war purposes.

My object in drawing attention to them is to show how unwise our experience shows it to be to lay down vessels of a speed which cannot be useful for war purposes should war arise. I am afraid that the very same error is about to be repeated. In the Navy Estimates for the present year provision is made for the expenditure of very considerable sums of money upon war vessels of speeds which it is already well known cannot be made available for war purposes. I take the following from the Estimates for H.M. Dockyards and Contract Work for 1888–89 :—

Names.	Speed in knots.	Total cost (estimated).	Proposed expenditure for the year.
		£	£
Buzzard	14·5	69,116	(Vessel just completed.)
Daphne	,,	63,082	17,155
Nymphe	,,	63,125	17,154
Beagle	,,	64,000	Not given.
Basilisk	,,	64,000	,,
Melita	12·5	61,619	23,233
Pheasant	13·25	40,951	15,260
Partridge	,,	40,994	16,629
Peacock	,,	40,755	12,155
Plover	,,	40,712	15,205
Pigeon	,,	40,712	13,895
Pigmy	,,	40,712	17,453
Magpie	13	41,839	25,344
Redbreast	,,	41,839	23,244
Redpole	,,	41,839	23,014
Widgeon	,,	41,000	23,656
Lapwing	,,	41,000	30,024
Ringdove	,,	41,000	30,024
Goldfinch	,,	41,000	27,687
Sparrow	,,	41,000	28,507
Thrush	,,	41,000	28,507
Total	..	1,001,295	388,146

Now I will not deny that there may be something to be said on behalf of some of these vessels, for something might be found to be said on behalf of almost any conceivable kind of vessel in a Service so vast and complicated as the Naval Service at present is. But I wish to take the sense of naval Officers on the question, and to ask them whether, looking to the utter disproportion of our fast cruizers to the services which will be required of them in war, it is or is not wise to

go on lavishing money in this way upon vessels not a single one of which reaches a 15-knot speed, and most of which are to be of only about 13 knots at their very best, which means only about 10 knots in regular sea service?

The problem of defending the mercantile marine of this country in war time—and the defence of that marine is for us a problem so vital that the matters upon which Parliament is expending its time and energy are, by comparison with it, trifles light as air—is one which, in my opinion has not yet been mastered, and indeed cannot have been mastered, for the simple reason that the many able and energetic men who have applied themselves to it voluntarily have had to do so with but an imperfect knowledge of official facts, while the official authorities have not even commenced, so far as we know, to organize a policy or a scheme for dealing completely with it.

One of the very first questions which has to be dealt with is, what is to become in war time of the vast number of sailing vessels and slow steamers which form so large a proportion of British merchant tonnage. The tables of Lloyd's Register Office furnish us with the following figures relating to the mercantile marines of Great Britain, France, Germany, Italy, and Russia:—

Nationality.	Total No. of steam and sailing vessels.	Total tonnage of steam and sailing vessels ("sailing" net, "steam" gross).
British—		
United Kingdom.....	9,091	9,127,454
Colonies	3,138	1,434,141
Total.....	12,229	10,561,595
French.....	1,479	995,918
German	2,086	1,387,365
Italian	1,700	885,459
Russian	1,228	430,300

I have placed these figures together to facilitate other objects than that immediately present to our view. But here we see that we possess, and have to give account in war time, in some fashion or another, of more than 12,000 steam and sailing vessels, but extremely few of which, even among the steamers, possess anything approaching to high speed. Of mercantile and passenger vessels of 19 knots speed and upwards we possess but four, viz., the "Etruria" and "Umbria," and the two Channel steamers "Victoria" and "Empress." Above 17 knots and below 18 we have five only, and these are all small, belonging to the South Eastern Railway Company and to the London, Brighton,

and South Coast Railway Company. Of vessels below 17 knots and above 16 knots we have 12, chiefly belonging to the P. and O., the Cunard, and the Orient Companies. Of 16-knot vessels we have 11, of 15½-knot 4, of 15-knot 23, of 14½-knot 20, of 14-knot 39, of 13½-knot 25, of 13-knot 46, and of 12½-knot 30.[1] If, therefore, we strike off from the total number of ships, viz., 12,229, these 219 steamers over 12 knots in speed, we shall still leave more than 12,000 vessels of which a few, the fastest, steam only at 12 knots. Of these 12,000 vessels, 6,514 are sailing ships, of an aggregate tonnage of 3,698,000 tons; and the remaining portion, of about 6½ millions of tons, consists of steamers of 12 knots or less, the great bulk of them probably averaging 8 to 9 knots at sea. Taking again Lloyd's figures, our British merchant shipping is in itself worth about 93,000,000*l.*, and it imports property worth 349,000,000*l.*, and exports property worth 269,000,000*l.* every year.

In view of these mighty interests, and of the fact that at present 140,000,000*l.* worth of our imports are food, it is incumbent upon all of us to do the best we can to face and to assist in solving the problem of its protection. One effectual way of doing this will be to get all the money allowed by the country and Parliament for the purpose spent upon efficient ships. We have seen how money has been recently spent upon ships which do not fulfil the country's needs. Let us collect a few ill-spent amounts, including some now contemplated:—

	£
Expended on slow unarmoured vessels brought to completion between 1880 and 1888, as set forth previously in this paper	3,806,693
Proposed cost of comparatively slow ships now under construction or about to be built.....	1,001,295
Cost of "Impérieuse" and "Warspite," whose armour is now under water at load draught (including establishment charges) taken from Navy Estimates 1888–89.....	1,269,000
Cost of seven belted cruizers in similar plight	2,000,000
	8,076,988

This sum would have secured to the country no less than 16 20-knot ships efficiently armour-belted, with very large coal supply (all as previously described), and I venture to say that whatever may be the opinions of those present on minor subjects, there are extremely few in this room who will not at once acknowledge that, could we at this moment exchange the motley lot of craft previously

[1] I take these figures from Lloyd's Register Office List, given in their "War Ships of the World" already quoted. They are not apparently as complete as they might be. For example, although most of what are known as our Channel steamers are given, together with the "Lily," "Anglesea," and "Shamrock" of the London and North Western Railway Company, the "Ireland" and other steamers of the City of Dublin Steam Packet Company do not appear to be included.—E. J. R.

enumerated for 16 ships of 8,000 tons each, such as I proposed to you in 1884, we should now be able, not indeed to rest upon our oars, or to cease to develop the war cruizer class, but to feel that we had made such a beginning as was in itself worthy of the Navy, and was such as might fairly be expected to stimulate the naval pride and ardour of the country.

But the pressing matter is to see if anything can be done in the way of advising or urging the abandonment of the slow vessels now commenced, or about to be commenced, in H.M's. Dockyards. Some of them certainly could be stopped if desired, for in the Navy Estimates of the present year they are set down as not yet ordered, and the estimates of their cost had not even been made. These were as follow :—

Name.	Tonnage displacement.	Speed in knots.
	tons.	
Beagle.....	1,170	14·5
Basilisk	,,	,,
Widgeon	805	13
Goldfinch	,,	,,
Sparrow	,,	,,
Thrush	,,	,,

I know not how the matter may shape itself to the minds of those who are here, but to my mind it seems a deplorable thing to go on spending public money on craft like these, when we know that our deficiencies in respect of fast cruizers are deplorable when viewed in relation to the work to be done.

In the "Daily News" of Tuesday last is reported a conversation which appears to have been recently held in Colombo with Rear-Admiral the Hon. E. R. Fremantle, C.B., the Commander-in-Chief on the East Indian Station. He is represented as having referred to a Russian vessel-of-war that had recently visited Ceylon, and to have said: "That is the sort of vessel that would catch and take any one of my small craft, and do what she liked with any one of our post-captain ships, or 'corvettes' as they are called. She could run away with either of the corvettes, and do exactly what she liked with any others on the station. The worst of it is, ours are all an obsolete class of ships. We have got more of the useless class of ships than any other European navy. The ships of which the East Indian squadron is composed (eleven in number), in addition to the flag-ship, are all obsolete." The writer adds: "Admiral Fremantle declares himself 'a great advocate of speed,' and asks what a naval commander is to do in time of war with 'horrible things that cannot go fast enough to catch anything or run away from anything?'" I know not whether Admiral Fremantle used these words; but whether

he did or not, it is certain that they do not greatly, if at all, exaggerate our condition; and to my mind the only remedy for our deficiency in respect of fast cruizers is to induce the Admiralty to put a complete stop to the building of slow ones, and to expend the money voted by Parliament for cruizers only upon fast and efficient vessels.

Admiral Boys: I shall detain you but one or two minutes. I do not propose to go into the details of this able paper of Sir Edward Reed's; I will only say generally, that with reference to some of the statements as put before us by the lecturer, I feel bound to agree with him, but others appear to be so palpably inconsistent, that I cannot but think that there must be another view of the matter, and I hope that gentlemen present will join in the discussion, so that we may hear both sides of the question. There is only one other observation I have to make, and that is as Chairman of the Council for the year: Sir Edward Reed says, "I wish the Council of this Institution would take this matter up, and investigate," &c. Now I must point out that by our rules the Council cannot undertake such an investigation. We as a body do not express our opinions upon the papers that are read. I would also remind members that the Council do not hold themselves responsible for any opinions that may be expressed in this theatre, and, as stated on the cover of the Journal, "authors alone are responsible for the contents of their respective papers." I now hope that we shall have a full discussion.

Captain W. H. Henderson, R.N.: I am sure that 95 per cent. of naval Officers will endorse Sir Edward Reed's expressions in even stronger language than he has used. I have just come back from Portsmouth, and the expressions that I have heard used by Captains in the Service regarding vessels, especially of the "Beagle" class, is stronger than anything that Sir Edward Reed has made use of. They say that they are quite unfit for any duty they may be called upon to perform. With regard to first-class cruizers, I certainly agree with Sir Edward Reed; I think that four belted cruizers of 8,000 tons would be better than the seven 5,000-ton ships that we have. With regard to the construction that has taken place since 1880, I think the best way of illustrating what Sir Edward Reed has put forward is to draw attention to what Sir Geoffrey Hornby said the other day at the Mansion House. He asked for 186 cruizers for the protection of our commerce, and said we only had 42 fit to do the work, and therefore that we wanted 144 vessels in order to ensure proper protection. A great many people have gone away with the idea that he asked for 144 additional ships, and have said it is impossible to grant this. What he really asked for was the reconstruction of the cruizer class, simply because the Admiralty have for the last eight years and more built vessels of inferior speed and coal-carrying capacity. Just before I came down here I counted in the Navy List for this month the number of second and third class cruizers and sloops as 98; gunboats and gun-vessels, that is sea-going vessels (I am not including coast defence vessels at all), as 69; making a total of 167; so that, strictly speaking, Admiral Hornby was only asking for an addition of 19 cruizers to the number of vessels now on the Navy List, the greater part of which should be fit to take their part in the protection of our commerce. If the 167 vessels that we now have were of sufficient speed, we should not now want this enormous addition to our fleet. Reconstruction was what he really asked for, not addition. There is another thing which naval Officers are taught, and thoroughly believe: it is the lessons to be learned from the action off Iquique, between the Peruvians and Chilians, on the 21st of May, 1879, between the "Huascar" and the "Independencia," on the one side, and the "Esmeralda" sloop and the "Corvadonga" gunboat on the other; the deduction is, that if a nation builds small unarmed ships inferior in speed to ironclads, it must expect to lose them. That is what we are brought up to believe, and yet Sir Edward Reed has pointed out that vessels are continuously being built which are inferior in speed to the battle-ships. Another thing which I wish to speak about is as to the idea of building vessels for peace service. Where it comes from I cannot say: I can only imagine—I do not wish to be disrespectful—that some Flag Officers have given rise to the tradition in the past by trying to elevate the

peace duties of stations of which they have had command as of more importance than the war requirements of the nation, and consider that it is necessary to have a certain slow vessel to do the routine peace duties of a station. This is utterly absurd. If you possess a vessel of speed and coal-carrying capacity, she will get round her station, will show the flag, and will do, in proportion to her speed and coal-carrying capacity, so much the more work than a vessel of inferior powers. I was recently in Australia, which is one of the most distant stations where we have to keep the police of the sea in the Western Pacific, which as you all know is one of the most uncivilized parts of the sea. We had out there five schooners, and afterwards two others were sent out. These schooners could not do their work: they could not get about. You had no means of getting communication with them; they covered very little distance. Strong representations were made, and two gunboats were sent out, but I put it to naval Officers here, would not a decent steamer capable of going 14 or 15 knots have gone the rounds and brought constant intelligence and done the work of that station very much more efficiently than those vessels which, directly they left the Flag Officer's sight, were absolutely out of control? I think the construction of the "Beagle" class and the "Pheasant" class an utter waste of money. I have heard naval Officers say, "Burn them," and others say, "Throw them into the sea, for you might just as well do it as build them." I do not want to take up the time of the meeting by going into the particulars, but of the "Buzzard" class we have five vessels built and building, costing 69,000*l.* each, with 14½ knots speed and 3,000 knots radius of action, carrying eight 5-inch guns, and 16 vessels of the "Pheasant" and "Redpole" class, costing about 42,000*l.* each, with 13 knots speed, and 2,500 knots radius of action, and mounting six 4-inch guns, making a total expenditure of over a million, as Sir Edward Reed has stated, and on vessels inferior in speed to the battle-ship speed of the day, and obsolete in their inception. I must inform Sir Edward that the "Beagle" is well under weigh at Portsmouth; it is too late to stop her construction; she will be ready for towing out of dock before very long. Naval Officers say that none of these vessels should be inferior in speed to the battle-ships, and to say that vessels of the required speed cannot be built is preposterous, because we are building torpedo gunboats with a speed of from 19 to 21 knots, and with the same radius of action of 2,500 knots. I look upon this million as a sheer waste of money. Coming to the second-class cruizers, the "Medea" class, I wish to say a word on which naval Officers feel very strongly. Those vessels are 265 feet long; they have 2,950 tons displacement, 9,000 horse-power, carrying 400 tons of coal; they have 8,000 knots as their radius of action, and carry six 6-inch guns, at a cost of 152,000*l.* apiece. Now every naval Officer and every captain of a steam merchant vessel, or indeed any sailor, would tell you if you expect a vessel to keep the sea and make a passage, she must not be less than 300 feet long. We can all see these vessels 260 feet long are too short; they should have been made longer without increasing their armament. This increase of length would have made them efficient vessels, and by enabling an increase to their coal supply, would make up for their great deficit.[1] The test of a second-class cruizer should be that she should really be able to go at the same speed as the "Umbria," 19 knots; that she should be practically able to steam across the Atlantic with the best of our fast merchant steamers. With regard to the "Barrosa" and the "Barham" class of vessels, the "Barrosa" class comprises four vessels of 1,580 tons each, 3,000 horse-power, a speed of 16½ knots, and a radius of action of 3,400 miles, carrying six 36-pr. quick-firing guns. The "Barham" class have 1,800 tons displacement, 5,500 horse-power, a speed of 19½ knots, but only a radius of action of 2,600 miles. Those are third-class cruizers, and again there is some discrepancy, something wrong here; 19½-knot vessels, with only 2,600 knots radius of action. We say that second and third class cruizers of the present time should have at least 19½ knots speed with the greatest

[1] One great defect in the steaming power of all men-of-war is difficulty of coal supply to the furnaces, consequent on its distribution for particular purposes over so much of the length. This defect will never be satisfactorily remedied until increase of length enables large coal bunkers to be placed right across ships on each side of and between the sets of boilers.

radius of action you can give them. I think we all consider that speed is of the very greatest advantage possible; speed and coal-carrying capacity are the two prime elements necessary for cruizers, because when a vessel has superior speed she has the power of trying her gun-fire, of using her torpedoes, and of ramming, while a vessel of inferior speed has no choice in the matter.

Mr. BADEN-POWELL: It seems to me that the question of fast cruizers is a vital one. Sir Edward Reed, as I understand, proposes a speed of 22 knots. I should like to know how war-vessels are going to be built to be able to keep up a speed of anything like 22 knots with the coal capacity which they at present have. I have seen over and over again large mercantile vessels coal, and know that the average consumption of an Atlantic liner is from 250 to 300 tons every twenty-four hours. Now if you take a vessel to a distant station it stands to reason that she must be capable of taking in not only 1,500 tons of coal, but 1,000 over that, in order to enable her to get out to her station. That is a point which I think has not been duly considered in the construction of the cruizers which the Admiralty have been building, and it does seem appalling to me the small amount of coal capacity allowed for cruizers. There is another point that struck me very forcibly, that was that the lecturer has not mentioned how these vessels should be rigged. I know that there are nautical men who say that a fighting battle-ship should not have masts and sails. At the Naval Review last year, and since, we have seen many of these cruizers rigged only with small jury masts, and an apology for a foreyard; how are these vessels going to keep on their station? Are they going to eat the coal the whole time they are out on the station? Are they going to eat their coal on the way out, and then have to fight on an empty bunker? They cannot do it, they would be captured directly. I should like to know whether the cruizers that Sir Edward Reed proposes are going to be fully rigged so as to be able to keep the sea under sail; with possibly some invention of Sir Edward Reed's for starting fires in a hurry (like the steam fire engines do on shore), to promptly get up steam when the enemy heaves in sight, or is reported to have been discovered; but otherwise to keep the station in the old style under sail. These are important questions with regard to cruizers; one affects the question of our coaling stations, and the other affects the question of keeping seamen as seamen; I think they are of great importance to the country. There is only one other question that struck me very forcibly with regard to cruizers; I can scarcely believe it to be true to say that naval architects in charge of the construction of ships can go and immerse those ships in the way that Sir Edward Reed says they do, can go and put slanting armour decks below an unprotected water-line, which, if the sides are penetrated by quick-firing shell guns, must produce such a capsizing influence that the vessel will be in such circumstances utterly unseaworthy. I hope Sir Edward Reed has not been telling us yarns: we are not marines.[1]

Captain CURTIS: Perhaps Sir Edward Reed would enlighten us a little more on this subject, about the 4 feet of armour in his proposed cruizers, because one would imagine that there was 4 feet of armour above water. He says, "The cruizers would have large thick belts, rising 4 feet above water, all along the broad central parts of the ship." Perhaps Sir Edward Reed will explain when the vessel is immersed in trim for sea, how much armour is above water, and also how much armour is above water when the ships are light, say with 50 tons of coal on board. I have heard Sir Nathaniel Barnaby lecture on his ships referred to here, and he

[1] I understand one of the assumptions in the Admiralty design—midship section of which was exhibited by Sir Edward Reed—was that the wedge space or wings above the slanting armoured deck were to be filled with coal as a protection, and kept full. But for a cruizer many days out on her station, and probably coming into action after a long full-speed chase, unless the coal below has been used first, which is very unlikely to be tried by sailors, though easily suggested from a chair on shore, the wing pockets might easily be filled with water when wounded. The case made out in the lecture simply reminds one at once of the almost similar conditions which capsized the "Austral," in the smooth water of Sydney harbour. A lopsided deck has poor manœuvring powers, and even if no worse happened than a heavy list, all broadside guns would be thrown out of action.—W. B.-P.

stated his vessels were designed to carry about 400 tons of coal, and the authorities placed 900 tons on board, which fully accounts for the immersion of the armour. Then with regard to the armour itself, I have stated before in this Institution that I have seen at Kinburn a spar that a 68-pound shot fired from the "Hannibal" had passed through, the aperture had closed so small that one could not put his finger through the hole. Now it seems to me that wood of this kind might be placed outside these ships. Formerly we used to place iron outside the old wooden vessels, but if you place wood or woodite outside the iron it might act as a protection against leakage, and then as the ship gets more immersed, instead of getting less buoyancy they will have more. It seems to me that if you were to penetrate a ship with a shot, the specific gravity of coal being greater than that of water, the coal would go out, and the water would come in. The result would be that the ship would have rather an awkward list on the opposite side, and the guns would be out of action. You might just as well put water-casks inside a ship to give her floating power, if you anticipate any buoyancy from under the armour-deck, as it appears to be flush with the water-line. I would suggest that perhaps we might find some way of protecting ships by some other substance instead of iron, something in the way they are now doing it, by sheathing outside. I might also mention[1] that when the main topgallant mast went through three of the "Marlborough's" decks, the Officer said he could not put his finger through the holes. That is another instance of the wood closing up after penetration; a hole has been made through it.[2]

Sir E. J. Reed: I feel very thankful to Captain Henderson for being good enough to come and make the statements that he has made, because they are obviously in furtherance of the aim that I have in view, and which, I have no doubt, naval Officers present have in view. As I think, owing to a slight want of clearness on one point, there might possibly be some misunderstanding, I should like to ask Captain Henderson if I understood him aright as to Admiral Hornby's views. What I think he seemed to say was that Admiral Hornby did not propose to add 167 cruizers to the existing Navy, but what the Admiral meant was that he should require the total number of cruizers which he stated, and that had the ships we possess been built of proper speed, then we should only have required about 19 more to bring our Navy up to what he considered necessary. You do not mean to imply that, having such vessels as we have, 19 cruizers would bring up our Navy to what it should be?

Captain Henderson: No.

Sir E. J. Reed: I understood you to say that if the Government had previously built efficient ships, we should now have required to meet Admiral Hornby's views only 19 additional ships.

Captain Henderson: That is so.

Sir E. J. Reed: I think Mr. Baden-Powell touched some very practical points. With regard to the vessel of 22-knot speed, I presume it is quite understood that the object of giving those high speeds to war-vessels is not that they may under any condition traverse larger ocean spaces at that enormous velocity; the object is, I apprehend, that while they perform this ordinary service with efficient speed, they should have the power, when the necessity of overhauling an enemy comes, of complying with that necessity. And one of the things that encourages me more than any other to urge the production of very fast ships is the striking economy with which a very fast ship will go slowly. I have had occasion lately, in designing some ironclad cruizers, to go into that very carefully, and I find that with such a speed as would be sufficient for a vessel in proceeding under ordinary circumstances to a foreign station, they can carry coal enough to go about 14,000 knots, and I myself think that even a supply of coal which would enable vessels to cross the Atlantic, say to go to the United States, at a speed of 14 or 15 knots, would be sufficient for the ordinary purposes of the Royal Navy. But I agree with Mr. Baden-Powell entirely in expressing astonishment at the coal supply of recent ships. One would

---

[1] This occurred in Sir William Parker's commission.

[2] No doubt in event of war these cruizers could have fittings outside, so as to cover any holes by penetration by placing plank sheathing; it appears quite feasible.

have supposed that, with this increase of speed, the necessity for which has been brought home to us, we should have made every effort to go on increasing the coal supply; but instead of that the characteristic feature of the modern fast vessels is that they have scarcely any coal supply at all. Now the ground of all that, or the excuse for it—for I cannot put it any higher than that—the excuse is the economy of the triple expansion engine; but then the utmost difference that one can anticipate in the consumption of fuel as between a good compound engine and a good triple expansion engine, is about ½ lb. of coal per horse-power per hour out of the 2¼ lbs. a compound engine will consume. A triple expansion engine will run upon 1¾ lbs. per horse-power, whereas a compound requires 2¼ lbs. That difference is not so very large, and cannot possibly be made to justify the recent large reductions in the coal supply of Her Majesty's ships. And yet what do we see? We saw that in the case of those belted cruizers when the power was sent up from 7,500 to 8,500 horses, the coal supply was reduced from 500 to 450 tons, and there we were with engines of 8,500 horse-power—about three or four times the horse-power of the old line-of-battle ships—with 450 tons of coal! Captain Curtis very properly pointed out that the state of those vessels has been—not wholly, I may say, but very largely—brought about by the fact that the present Board of Admiralty have insisted on putting into these vessels a larger coal supply than was contemplated.

Captain Curtis: I wished to exonerate the naval architect.

Sir E. J. Reed: And that does largely exonerate the naval architect. It is a very delicate matter for me to discuss the responsibilities of naval architects, but what I should say is that I would visit upon any naval architect this measure of responsibility in the matter: and I would say every naval architect ought to remember that an armour-belt of only 5½ feet in width is a sham belt and not a real one, and does not give you the power of meeting those many contingencies which beset ship-owning and ship-working; and, therefore, the complaint I would make against the naval architects of these vessels is this, that when it had been stated by another naval architect (myself) in this hall, that a ship to steam at the high speed that was desired, to carry a large coal supply, and to have an efficient belt, required to be a ship of 8,000 tons—a statement which was not at all contested here—that they should have set themselves up as so much cleverer than other people as to go and produce a ship of 5,000 tons, and pretend that with that vessel they could accomplish the object. That is where I blame them. A naval architect should have known that 8,000 tons was necessary for the speed aimed at, for the coal supply desired, and for the efficient belt. I must say it is a very unfortunate thing that any body of gentlemen—naval architects or naval Officers, or any other responsible persons in the Admiralty—should have placed the present Board of Admiralty in the position of either having to send these vessels, seven of them from our ports, with this enormous horse-power for their size, and with a ridiculously small coal supply; or else should have to accept the other alternative, namely, putting in a reasonable coal supply, and sending them out with their entire armour below water. I do not think we can quite relieve the naval architects of responsibility because they tried to do, or they undertook to do, what the laws of nature and the facts of science both would have shown that they could not do. However, I may say that this matter is quite incidental. It is perfectly true, as I have stated in this paper, that I never have allowed myself at any time to cavil about small questions, or to discuss any minor shortcomings in Her Majesty's ships. I think anyone who knows the circumstances will know that a man who has been fourteen years in the House of Commons, if he had had the disposition to agitate upon small shortcomings, would have had hundreds of opportunities such as I certainly have not availed myself of. All I have ever done has been to endeavour to put a stop to some extraordinary violation of common sense, and I am very glad to have the testimony of Mr. Baden-Powell to the fact that he can hardly understand any naval architect approving such arrangements as I have referred to. Well, that is precisely my difficulty. I know that the naval architects are sane, and that they do propose these things; but how, being sane, they do propose them, and persist in them, is a problem which I am quite unable to solve. I can only say that in my judgment the largest danger to this country is due to the fact that some

of these unaccountable things have been done. There was a time when one was fighting the up-hill battle of condemning the "Admiral" class because of their extremely limited surface of side armour. All necessity for that kind of effort is now gone, when we know, when you gentlemen know, when the world knows, that these [pointing to the belted cruizer with submerged armour, and to the deck-protected cruizer, with her defensive plating also submerged] are the sort of things to which the kind of advice acted upon of late years has brought us to. All the armour is put below water in order to carry even a moderate supply of coal to sea. When you see these things, you will, perhaps, think there is some ground for my apprehensions in the case of other vessels, although their armour may not have been put entirely out of sight. I would like to say one more word upon the question of coal supply. What I do not understand is why the coal supply has been kept down as it is; because nothing is more common in designing, nothing is more the daily experience of men engaged in the profession that I belong to, than the proof positive that some increase in length of ships and coal-carrying does not impose heavy penalties upon you in the way of the construction of ship or of construction of power to drive it. When you have got those long fine-lined ships, you can very well afford to put a short length of middle body in in the middle of your cruizer. But unfortunately we have gone upon the opposite system, and making ever-increasing demands upon the ships' speed, we have taken the coal out of them more and more. That is not all. Mr. Baden-Powell has drawn attention to another thing equally unaccountable, and exactly of the same nature, and that is, that having crippled and paralyzed steam ships for want of coal supply, we have also taken away from them every possible means of helping themselves along by sail. I should be very sorry to express any strong opinion on the rigging of cruizers in the presence of Officers far more able than I to give an opinion; but I will say this, that when the line-of-battle ship "Devastation" was designed, I did not hesitate to deprive her of sail power. I have never been able to understand, and I do not now in the least understand, why these fast cruizers are deprived of all sail power. I am quite aware that it is easy to show what a long way a ship can go on a very small supply of fuel; but what makes me feel the difficulty a little more is this, that while we have taken out all masts and sails from this class of vessels, we have not taken away the seamen who are to work them; but to my surprise I find that the "Orlando," a vessel of this class, has no less than 458 Officers and men. Had she possessed some measure of sail power, she would not have required additional men. I state that with great confidence, because I have compared her complement of Officers and men with the complement of a ship that carries considerable sail power, and she has the same number within five: therefore she has a complement for working canvas if she had it. Captain Curtis drew attention to the probability of being able to assist a vessel with thin sides by employing wood or woodite or some other like material on the outside, because of the property which it possesses of closing up again. The difficulty I think in that matter is this, that the reason that an elastic substance like woodite, or wood, or sawn fir closes up again after the shot has gone through, is that it is able to yield more or less to the passage of the shot. And if it were a sheet of woodite fired at, I apprehend the shot would tear its way through, the woodite yielding, and flying back into its position and closing up, because what would have been made would be not a hole but a tear. But if you put that sheet inside of a plate, and then fire at it, you will make not a rent but a hole, because you will punch out the piece, and it seems to me the conditions of an elastic substance, backed by a rigid substance, are those which would deprive the elasticity of the opportunity of doing its work. I feel that difficulty, but at the same time I would point out that cellulose, which is being a good deal used in the French Navy, and is praised by French designers, is not used outside but inside, as woodite should be, and it has been proved by experience that when you put that inside, and a shell or shot passes through the plating outside, and then through the cellulose or woodite, the cellulose or woodite closes up afterwards, and keeps a great deal of water out. I am not an opponent of any device of that kind. But what I am an opponent of, is the substitution of any device of that kind for effectual modes of keeping out shot and shell, say the substitution of cellulose for steel armour, and

then for those who have made the substitution to have the effrontery to tell the world that they have "protected" your ship. In conclusion, I maintain that nothing has happened among us to make me hesitate for a single moment to believe that this country can perfectly well afford, and ought to expend, whatever money is necessary for producing the very ships that it desires and that it ought to have, and I do not believe that either common sense or any true spirit of economy has yet driven us either to india-rubber, or cellulose, or fir, or anything of the kind in substitution for the trustworthy defence of steel armour-plates, which we know cannot be penetrated by the minor armaments of the enemy.

The CHAIRMAN: It only remains for me (and I am sure you will wish me to do so) to thank Sir Edward Reed very cordially for his paper. It has not had the effect of producing a long discussion, but the remarks from Captain Henderson and Mr. Baden-Powell and others I am sure have elicited in the reply a still greater amount of valuable information. I do not think anything can be more certain than the closing remarks Sir Edward Reed made, that nothing should induce this country to grudge any amount of money that is necessary to produce the most perfect ship, whether battle-ship or cruizer, that science has shown can be produced.

OCCASIONAL PAPERS.

This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

HORSE ARTILLERY IN VARIOUS ARMIES.

By Captain C. E. Callwell, R.A., Staff Captain, Intelligence Division.[1]

(Communicated by permission of H.R.H. the Commander-in-Chief.)

An impression appears to exist—an entirely erroneous impression—that, as regards horse artillery, the British Army is, in proportion to its fighting strength, weaker than are the armies of the great military Powers of the Continent.

Modern nations do not all attach a horse artillery Division to the corps artillery. France and Germany are the only foreign Powers that contemplate this arrangement, these countries possessing a sufficient number of horse artillery batteries to leave over one or two for the corps artillery of each army corps, after providing for the cavalry Divisions. Russia, Austria, and Italy do not employ horse artillery except with their cavalry.

That no horse artillery exists in this country for service with the yeomanry is in accordance with the general practice abroad. No country, except Russia, keeps up in peace time horse artillery for service with cavalry in 2nd line. Germany, on mobilization, forms certain horse batteries for service with reserve cavalry, but these exist only on paper in time of peace. Russia employs some irregular horse batteries which exist in peace time, and also forms certain fresh batteries of a similar nature to act with the Cossacks. But France, Austria, and Italy absorb their entire force of horse artillery into their field armies in 1st line.

[1] *Note by Hon. Editor.*—I must, on behalf of the R.U.S. Institution, be allowed to express my acknowledgments of the kindness of the military authorities in allowing me to insert in the "Occasional Notes" this contribution from the Intelligence Division. A lecture on Horse Artillery, by Capt. W. J. Robertson, R.H.A., appeared in No. 144 of the Journal.—L. A. H.

The following three tables show the true proportions of horse artillery to cavalry and to field artillery in England, in England and India combined, in Germany, Russia, France, and Austria, and also in Italy.

TABLE I.—*Peace Establishment.*[1]

	England.	England and India.	Germany.	Russia.	France.	Austria.	Italy.
No. of H.A. batteries	9	20	47	50[4]	57	16	6
,, guns....	46	112	200[3]	284[4]	342	96	36
No. of cavalry	12,600[2]	43,500	64,600	120,000[4]	69,000	42,000	24,000
No. of cavalry horses.	7,300	37,000	62,400	97,000[4]	63,000	37,000	19,500
No. of guns per 1,000 cavalry	3·7	2·6	3·1	2·4	4·9	2·3	1·5
No. of field artillery guns	200	468	1,338[3]	1,314	2,352	648	672
No. of H.A. guns to 100 field artillery guns.....	23	23	15	21	14	15	5

[1] In these tables the cavalry are given in round numbers; the figures could be given to a man in every case as regards peace establishment, and in most countries as regards war establishment.

[2] This includes 1,300 men with the cavalry depôt, belonging to regiments abroad.

[3] Germany has 6 horse and 35 field batteries with 6 guns, remainder 4 guns.

[4] These figures include Cossacks and Cossack H.A. batteries.

The peace establishment of horses has been given in this table, as showing that the establishment of our cavalry is really in peace time lower, as compared to foreign countries, than would appear from the number of men. If the proportion of horse artillery guns to cavalry were calculated from the number of horses on the cavalry peace establishment, the figures would be—England, 6·3; Germany, 3·2; France, 5·4, &c.

TABLE II.—*War Establishment.*

	England.[1]	England and India.[1]	Germany.	Russia.	France.	Austria.	Italy.
No. of H.A. batteries	11	22	62	68	57	16	6
No. of H.A. guns...	66	132	372	436	342	96	36
No. of cavalry	28,500	59,500	11,1000	210,000	100,000	61,500	24,000
No. of H.A. guns per 1,000 cavalry	2·3	2·2	3·3	2·0	3·4	1·5	1·5
No. of field artillery guns.....	336	568	3,186	3,108	4,074	1,360	1,310
No. of H.A. guns to 100 field artillery guns	19	22	11	14	8	7	2·7

[1] In these columns depôt horse and field batteries have been counted as well as yeomanry, and volunteer field batteries, since in case of invasion—the only case in which yeomanry and volunteers can be employed—the depôts would certainly be used as service batteries. Batteries told off to form ammunition columns have been counted as batteries.

In this table the establishments of cavalry are given by the number of regiments and squadrons at their war establishment, not by the number of men available on mobilization. Reserves abroad are far larger, proportionally, than in this country. In France, according to "Avant la Bataille," there are available fully 150,000 trained cavalrymen. Of the 436 horse artillery guns shown for Russia, only 168 belong to the regular horse artillery batteries.

TABLE III.—*Field Artillery.*

	England.	England and India.	Germany.	Russia.	France.	Austria.	Italy.
No. of army corps ...	2	Not published.	19	18 to 24	18	14	12
No. of cav. Divisions.	1		9	18	6[2]	8	3
No. of H.A. batteries	8		47	36	57	16	6
No. of H.A. guns....	48		282	216	342	96	36
No. of cavalry	6,900[1]		61,900	72,000	56,000	43,000	18,700
No. of H.A. guns per 1,000 cavalry	7		4·5	2·9	6	2·2	1·9
No. of field artillery guns	132		1,902	2,288	2,280	1,232	1,008
No. of H.A. guns to 100 field artillery guns.....	36		15	9·5	15	8	3·6

[1] Includes mounted infantry.
[2] France would probably form 9 or 10 cavalry Divisions in case of war.

From these three tables it is obvious that England is relatively stronger in horse artillery than any foreign country, except perhaps France. In Table II, where the proportions of horse artillery guns to 1,000 cavalry are less than in Germany, the cavalry include yeomanry, which can only serve in the United Kingdom; excluding yeomanry, the war establishments of cavalry in England, and in England and India combined, are very slightly larger than the peace establishments. This being the case, and the tables showing uniformly that the proportion of horse to field artillery is far larger in this than in foreign countries, the net result of the statistics is to prove that we are strong enough in horse artillery, but not strong enough (even counting batteries intended to act as ammunition columns as batteries) in field artillery.

On a war footing France and Germany have only from five to six times as many horse artillery guns as there are in England, but they have from nine to twelve times as many field artillery guns.

In comparing the strengths of horse artillery in our Army with that in others, there is one point worth noting. Horse artillery is undoubtedly necessary to every well-ordered army, but it is also admittedly the most expensive branch of the Service. Foreign countries do not, as is the case with us, increase its costliness (and in doing so further limit the amount of it permitted by financial considerations) by giving to officers, or, as a rule, to non-commissioned officers and men, a higher rate of pay and an uniform—to any appreciable extent—handsomer than that given to the field artillery.

COLONEL v. LÖBELL'S[1] ANNUAL REPORTS UPON THE CHANGES AND PROGRESS IN MILITARY MATTERS DURING 1887.

By Colonel H. HILDYARD, Highland Light Infantry.

THE present publication is the fourteenth of the series commenced in 1874, which form together a complete record of the reorganization of every army in Europe, and of the nature and constitution of the military resources of every State of any importance from a military point of view in the world. Year by year the changes introduced in the organization, armament, and tactics of each arm have been noted and collated, with the method and regularity inseparable from German writings, and with an accuracy that admits of no question.

The result is a work of the highest military value, the only drawback of which is its bulk, for the present volume comprises 522 pages, exclusive of those occupied with the obituary notices of superior Officers whose decease has occurred during the year. From its nature, containing as it does statistical information and reports derived from so many different sources, brought up to the close of the year reported on, some delay in publication is inevitable, but it is an improvement upon the earlier years of the publication that it was brought out this year in the middle of the month of May. Unfortunately, some further delay must occur before the present compilation can appear in the pages of the Journal, and to those who have followed, by the help derived from other sources, the various changes and developments that have taken place in the several departments of military organization and art, much of what follows will read as ancient history.

But it is not everyone who takes an interest in military matters who has been in a position to keep himself up to date regarding them; and apart from this a concise record is of use, if only for reference.

The arrangement of the work does not differ from that of preceding years. The 1st part comprises the Reports on the progress in the several armies, those of the central Powers being the most detailed, and it is noticeable that, of the four, Italy has the largest space allotted to it. To the minor States in Europe and elsewhere less attention is paid than is usually the case; the only ones noticed in any detail are Belgium, Holland, Denmark, and Turkey in Europe, and Morocco, in North Africa.

The 2nd part is occupied with Reports upon the several branches of military art, including the tactics of the three arms and of fortress warfare; on small arms and artillery; ballooning and military literature. The 3rd part is reserved exclusively for military obituary notices. Again, as in the Reports for 1886, military history finds no place, and it is some satisfaction to note that, notwithstanding the feverish activity regarding military preparations and armaments that has prevailed throughout every State in Europe, the last two years have been absolutely free from active military operations of any importance.

[1] "Jahresberichte über die Veränderungen und Fortschritte im Militärwesen," 14 Jahrgang, 1887, herausgegeben von H. v. Löbell, Oberst z. Disp.—Berlin. Ernst Siegfried Mittler und Sohn. 1888. Pp. 568; size, 9·5″ × 6·5″ × 1″; weight, 2 lbs. Price 9*s*.

Germany.

New Law increasing the Peace Strength of the Active Army.—The Bill brought in late in the autumn of 1886 for adding to the peace strength of the army not having been accepted in its entirety, the Reichstag was dissolved on the 14th January, 1887. The newly elected House assembled in the following month, and on the 11th of March the new law was passed. The following were its principal provisions:—

1st. The peace strength of the army in men for the period between the 1st April, 1887, and the 31st March, 1894, was fixed at 468,409. The one-year Volunteers are not included in this number. 2nd. From the 1st April, 1887, the formations were to be 534 battalions of infantry, 465 squadrons of cavalry, 364 batteries of field artillery, 31 battalions of garrison artillery, 19 battalions of pioneers, and 18 battalions of train.

The law of the 6th May, 1880, previously in force, and cancelled by the new law, had fixed the peace strength at 427,274 men, being 1 per cent. on the census of the 1st December, 1875. The strength of 468,409 men fixed by the new law was 1 per cent. on the census of the 1st December, 1885, the consequent increase to the army being 41,135 men. The bulk of the increase was allotted to the infantry, not only with a view to meeting military requirements, but also from motives of economy. An augmentation was also made to the field artillery, the railway troops, and the train. The garrison artillery and the pioneers were considered only so far as to meet local requirements, especially in regard to the reorganization of the military telegraph service. No new formations of cavalry were created. The following were the new formations:—

5 infantry regiments (4 Prussian, 1 Saxon).
15 infantry battalions (all Prussian).
1 jäger battalion (Saxon).
24 batteries (17 Prussian, 2 Bavarian, 3 Saxon, 2 Würtembergian).
9 railway companies (6 Prussian, 1 Bavarian, 1 Saxon, 1 Würtembergian).
1 pioneer company (Prussian).
14 train companies (12 Prussian, 1 Saxon, 1 Würtembergian).

Staffs for the following formations were also created besides those belonging directly to the above troops:—

For 2 infantry divisions.
„ 4 infantry brigades.
„ 1 cavalry brigade.
„ 21 field artillery divisions (16 Prussian, 2 Bavarian, 1 Saxon, 2 Würtembergian).
„ 3 railway battalions (2 Prussian, 1 Bavarian).

The surplus of the men not required for the new formations was allotted to the existing ones. The formation of one of the new divisions, the 32nd, was rendered necessary by an increased strength of the 12th (Saxon) army corps, which had 12 infantry regiments and 3 jäger battalions; that of the other division (the 33rd) was due to the special circumstances of the 15th army corps. The previously existing staff of the cavalry division belonging to the 12th army corps was reduced. In the interests of economy the 15 newly created infantry battalions were not formed into new regiments, but were added as fourth battalions to previously existing ones.

In Prussia the newly created 33rd infantry division was formed of the 65th infantry brigade (4th Magdeburg Regiment, No. 67, and the 136th infantry

Regiment), and the 66th infantry brigade (the 97th and 99th infantry regiments and the 105th Saxon regiment); 4 new infantry regiments, the 135th, 136th, 137th, and 138th, were raised, each of 3 battalions designated 1st, 2nd, and 3rd battalions respectively, and 4th battalions were added to the following 15 regiments:—

To the	4th Westphalian regiment	No. 17
„	4th Baden „ (Prince William)	„ 112
„	5th Baden „	„ 113
„	6th Baden „	„ 114
„	Hessian Fusilier „	„ 80
„	3rd Hessian „	„ 83
„	Hohenzollern Fusilier regiment	„ 40
„	5th Rhenish „	„ 65
„	1st Westphalian „	„ 13
„	3rd Westphalian „	„ 16
„	Lower Rhenish „	„ 39
„	5th Westphalian „	„ 53
„	1st Posen „	„ 18
„	3rd Pommeranian „	„ 14
„	Infantry regiment	„ 129

The four battalions of these regiments were designated the 1st, 2nd, 3rd, and 4th battalion respectively. The companies were numbered throughout from 1 to 16.

A division staff and one field battery were formed for each of the following artillery regiments:—

The	2nd field artillery regiment of the Guard	
„	1st Baden field artillery regiment	No. 14
„	„ „ „	„ 15
„	West Prussian field artillery regiment	„ 16
„	2nd Pommeranian „	„ 17
„	2nd Brandenburg „	„ 18
„	Thuringian „	„ 19
„	Posen „	„ 20
„	Upper Silesian „	„ 21
„	2nd Westphalian „	„ 22
„	2nd Rhenish „	„ 23
„	Holstein „	„ 24
„	2nd Hannoverian „	„ 26
„	Nassau „	„ 27
„	2nd Baden „	„ 30
„	Field Artillery Regiment	„ 31

By the help of these new formations, the field artillery regiments specified were formed each into 3 divisions of 3 batteries. These divisions are numbered consecutively the 1st, 2nd, and 3rd. In the 1st Baden regiment one of the batteries of the 3rd division is a horse battery. Besides the above, one more battery was raised and added to the Grand-Duke of Hesse regiment as the 6th battery of the 2nd division.

The railway regiment was increased by two battalions forming the 3rd and 4th, the companies being numbered 9 to 12, and 12 to 16 respectively. The 15th company was formed from the Saxon and the 16th from the Würtemberg contingent. The balloon division, consisting previously only of detached Officers and men, was given a permanent establishment, but continues to form an integral portion of the railway regiment.

A third company was added to the 1st, 3rd to 11th, 14th and 15th train battalions.

In Bavaria a division staff and one battery were added to the 1st and 4th field artillery regiments, each of which was formed into 3 divisions of 3 batteries; 1 railway battalion staff and 1 railway company were also formed.

In Saxony the cavalry division as such was broken up. The two infantry divisions previously called the 23rd and 24th, consisting each of 2 infantry and 1 cavalry brigade, were called the 1st and 2nd divisions Nos. 23 and 24 respectively. A new 32nd division, consisting of the 63rd and 64th infantry and 32nd cavalry brigades, was formed and added as a 3rd division to the the 12th (Saxony) army corps, and the 104th and 133rd regiments (5th infantry brigade, No. 63), as well as the rifle fusilier regiment No. 108 and the 6th infantry regiment No. 105 (6th infantry brigade, No. 64), were added to it. As the latter regiment is attached to the 15th army corps, the 12th, 13th, and 15th Jäger battalions were transferred to the brigade. The last named Jäger battalion, as well as the 11th infantry regiment, No. 139, which was attached to the 3rd infantry brigade, No. 47 of the 2nd division, No. 24, were new formations.

The three cavalry brigades were formed each of 2 regiments; the 1st Hussar regiment, No. 18, joined the 24th, the Carbineer regiment and the 2nd Uhlan regiment, No. 18, joined the 32nd brigade.

By the formation of a division staff and three batteries and the removal of two batteries from the 1st field artillery regiment, No. 12, a third division was added to the 2nd field artillery regiment, No. 28, and a horse division of three batteries was formed.

A railway company was also formed and attached to the Prussian railway regiment, and the 12th train battalion was increased by a third company.

Lastly, two new Landwehr battalions were formed and a different disposition was made in the allotment of Landwehr battalions to the infantry brigades.

In Würtemberg 2 field artillery division staffs and 2 new batteries were formed, as well as a railway company attached to the Prussian railway regiment.

Appointment of separate Inspectors-General for the Field and Garrison Artillery.—From the 1st April, 1887, the Inspector-General of Artillery was converted into an Inspector-General of Field Artillery, and a new appointment made of an Inspector-General of Garrison Artillery, with a view to completing the entire separation of these two branches. Each of them has a Chief of the Staff, several adjutants and the necessary subordinate staff.

Duties of the Inspector-General of Field Artillery.—He conducts the general and personal administration and supervises its training as well as the efficiency of the matériel. The individual units are as a rule to be inspected every two years, preferably during the period of gun practice. He is a member of the Defence Committee, president of the 1st Section, or, if senior to the Inspector-General of Garrison Artillery, of the whole Artillery Committee, and belongs to the governing body of the united Artillery and Engineer School.

The Inspector-General of Field Artillery is placed directly under the Emperor, and has to submit to His Majesty all matters requiring his decision, as well as the reports of the inspections made. Immediately under him come the Field Artillery Inspections, which are divided again into brigades and regiments. The Examination Committee for Captains and Lieutenants is also under him, and also the places for gun practice, so far as these do not come under the army corps commander. He has within his sphere the

same powers as regards granting leave and awarding punishment as a General Commanding a corps.

Duties of the Inspector-General of Garrison Artillery.—He conducts the general and personal administration of the garrison artillery, supervises its training and exercise, and co-operates in all questions relating to fortresses that affect artillery. He also conducts the personal administration of the artillery depôt inspections and of the laboratory personnel. Submissions to the Emperor of Officers for appointment to the post of Artillery Depôt Inspectors must have the concurrence of the War Department before being put forward.

The several units of the Garrison Artillery have to be inspected yearly, and the inspections are to be so arranged that each is seen in alternate years at gun practice and repository drill respectively. The Inspector-General is a member of the Defence Committee, president of the 2nd Section, or, if senior to the Inspector-General of Field Artillery, of the whole Artillery Committee, and he belongs to the governing body of the united Artillery and Engineer School.

He is directly under the Emperor, and submits to him all matters requiring His Majesty's decision, as well as the reports of the inspections made of the Garrison Artillery. The four Garrison Artillery Inspections are under his charge, and these again are subdivided into Garrison Artillery regiments. He has also under him the Artillery School of firing, the Laboratory School, the Examination Committee for Captains and 1st Lieutenants of Garrison Artillery, and those ranges which are set apart for the practice of that branch, so far as questions are not at issue that have to be decided by the General Commanding the army corps. He has in matters of leave and punishment the powers of a General Commanding an army corps, except as regards the conviction of men belonging to the artificer divisions.

Constitution and Objects of the Artillery Committee.—The Committee is formed of superior Officers of the Field and Garrison Artillery, who meet from time to time to discuss important artillery questions. To these questions belong the regulations and organization of the two branches, their armament and equipment, as well as their practical employment and the application of new results gained by technical experiments and in the science of artillery.

The Committee consists of two Sections, of which the 1st, under the presidency of the Inspector-General of Field Artillery, deals with questions relating to that branch, and the 2nd, under the presidency of the Inspector-General of Garrison Artillery, discusses those appertaining to the Garrison Artillery. Questions relating to both branches are discussed by the entire Committee under the presidency of the senior of the two Inspectors-General.

Recruiting for the Army, 1887–88.—The following is the proportion of recruits incorporated under the Order of February, 1886 :—

To each battalion of infantry on the higher establishment	....	230
„ „ „ on the lower „	....	200
„ „ of Jägers and rifles	.....	190
„ cavalry regiment, at least	.....	150
„ horse battery on the higher establishment, at least		30
„ „ on the lower „ „		25
„ field battery on the higher „	.....	35
„ „ on the lower „	.....	30
„ battalion of garrison artillery on the higher establishment	.....	200
„ battalion of garrison artillery on the lower establishment and each pioneer battalion	....	160

To each battalion of the railway regiment	135
„ company of train—	
for three years' active service	15
for six months' active service in the autumn of 1887 and the spring of 1888	38

In Bavaria the proportions differ somewhat, but not in any great degree.

New Patterns of Field Equipment.—During the past few years extensive trials of equipment have been made, with the object of reducing the weight of the articles to be carried to the minimum compatible with durability.

In the infantry, jägers and rifles a smaller pattern knapsack has been approved, with a bag attached for carrying the iron rations, with the necessary straps.

With the exception of the Grenadier battalions of the Guard and the Grenadier regiments, Nos. 1 to 12, these are of black leather. It has been further decided that the entrenching tool and water-bottle, in place of being carried as they were previously by means of slings, shall be attached to the waistbelt and haversack respectively; that the sabretache shall be made smaller after a new pattern, and that the cover of the entrenching tool shall be lightened.

The whole of the infantry and other foot formations are to carry in war a pair of laced shoes made of waterproof material. The haversack is to be also waterproof, in two parts, arranged to fasten on the waistbelt, and with a ring to which the water-bottle can be attached. New patterns of ammunition-pouch and of cooking utensil were also introduced. The same equipment with black belts is to be worn by the Garrison artillery.

Prizes have been offered for a water-bottle and for a saddle fulfilling certain specified conditions.

Training of Reserves and Landwehr.—The following were specially called up in 1887 for instruction in the use of the new rifle (pattern 1884) during 12 days :—

Infantry	68,200	men, including non-commissioned officers
Jägers and rifles	4,800	
Total for instruction	73,000	

For the ordinary drills the following were called up :—

From the Reserve—		
Infantry	104,500	men
Jägers and rifles	2,500	„
From the Reserve and Landwehr—		
Field artillery	4,070	„
Garrison artillery	2,610	„
Pioneers	2,270	„
Railway regiment	560	„
Train	5,304	„
Total Prussian corps	121,814	„
And of the Bavarian corps	10,490	„
General total Army Reserve and Landwehr	132,304	„

The number of men called up from the Ersatz reserve was—

For a first drill of 10 weeks	13,998
„ second drill of 4 weeks	10,000
„ third drill of 14 days	8,500
„ fourth drill of 14 days	7,200
	39,698
And of the Bavarian corps	5,950
Grand total of Ersatz Reserve....	45,648

The general total, therefore, of the reserves and landwehr called up for training or instruction during the years 1887–88 amounted to 250,952 men.

Belgium.

An extraordinary vote of credit, amounting to 19,273,836 francs, was passed after long and heated debates, the principal portion of which was for the purposes of the Meuse defences (Lüttich, Namur, Huy), the forts of Rupelmonde and Schooten, changes in the inner front of the north citadel at Antwerp, the arming of the intrenched camp, and the armament of the infantry and field artillery.

The project of creating extensive defences on the Meuse was an old one which had been discussed from time to time, and regarding which two opinions prevailed. It was argued by one party that the measure was absolutely necessary, looking to the state of Europe and to the insufficient security for Belgian neutrality being upheld by the five guaranteeing Powers. On the other hand, the construction of works on the frontier would mean the weakening of the existing field army by having to furnish garrisons for them, which was regarded by the opponents of the measure as a very serious matter.

On the question being referred to a military Commission of General Officers, 13 in number, they were unanimously in favour of the proposed works being constructed, but on the express condition that the field army should not be weakened. The project was approved by the legislature, and 8 million francs out of the 24 millions necessary for the completion of the works were taken in the vote of credit. A sum of 5½ millions was also granted for the armament of the forts.

The scheme does not involve a connected line of defence between Lüttich and Namur, but only the construction of a series of detached forts, the intervals between which are to be secured by flank defence. No intrenched camp is to be constructed there, but strategical bridge-heads, forts to block the roads, and similar pivots on which to manœuvre. The new forts command all the approaches, and require only weak garrisons (400 men per fort and 200 per minor work). Round Lüttich 12 works will be built :—6 forts, and 6 minor works ; round Namur 9 works :—5 forts, and 4 minor works. At Huy all that is being done is to strengthen the existing citadel, so that it may serve as an efficient fort to block the way.

The new works will be built having regard to the latest technical improvements, and be secured against the effects of the strongest known explosives. Their armour will have a thickness of 25 cm., and they will be provided with cupolas.

Distribution of the Belgian Forces in War.

	Men.
1st. Garrisons of—	
Lüttich, including 1 brigade of the mobile reserve	6,997
Namur, including 1 regiment „ „	5,124
Huy	541
2nd. Antwerp—	
Garrison	24,064
Mobile division belonging to the entrenched camp	11,921
3rd. Advanced position of Antwerp—	
Termonde	4,796
Diest	2,594
4th. Depôts, sedentary troops, gendarmerie	5,422
Total garrison troops	61,459
5th. Field army, 2 army corps	67,732
Total of the Belgian mobilized army	129,191

It was frequently stated in the debates that, in the event of war, only about 100,000 men would be available, and that after some weeks an additional body of about 30,000 men might be got together, who would have forgotten their training, have become unused to discipline, and would be provided neither with cadres nor with Officers.

The strategical value of the new Meuse line may be summed up as follows: it has a certain military importance both for France and for Germany. For the French army it may serve as a *debouché* against the Lower Rhine, as the *trouée* of Belfort against the Upper Rhine; on the other hand it would permit the German army to march on the Oise, and turn the French Moselle, with its numerous artificial and natural obstacles. The fortifications of the Meuse are not designed exclusively for the Belgian troops, they would therefore only offer resistance to an attack in force; their principal object is to open their doors to that army which is allied with Belgian troops, so soon as one or other of the combatants violates Belgian territory, and make available for it the innate strategical advantages offered by the position. So far as it appears there is no intention of abandoning the principle of the concentration at Antwerp.

Militia.—A project was brought forward by Count d'Oultremont in the Chamber for obligatory service, the division of the contingent into two classes, its increase and the curtailment of the period with the colours in favour of those militiamen who proved themselves worthy of it. The army set their hopes upon this measure—which would have greatly improved the military condition of Belgium—being passed into law, but it was opposed in the Chamber and thrown out by a few votes.

Ambulance and Hospital Services in the Field.—New regulations were issued in February, 1887, for these services which were dealt with under five heads. These are: 1st. Organization and composition of the Sanitary service; 2nd. Handling of the Sanitary service on the field of battle; 3rd. Private assistance and societies for the aid of the sick and wounded; 4th. The evacuation of sick and wounded from the sphere of operations; 5th. Administration and various instructions.

The following is the composition of the several ambulance columns and flying hospitals answering to our bearer companies and field hospitals respectively:—

1st. Ambulance Column with Army Headquarters—

Officers	2
Other ranks, including train	76
Horses	19
Wagons	4

2nd. Infantry Ambulance Column, attached one to each infantry division—

Officers	5
Other ranks, including train	226
Horses	58
Wagons	14 and 4 cacolets.

3rd. Artillery Ambulance Column, attached one to the headquarters of each army corps—

Officers	5
Other ranks, including train	78
Horses	31
Wagons	8

4th. Cavalry Ambulance Column, attached one to the headquarters of each army corps—

Officers	5
Other ranks, including train	84
Horses	26
Wagons	6

5th. Flying Hospital, attached four to each army corps—

Officers	7
Other ranks, including train	43
Horses	22
Wagons	5

With a division on the field of battle, the Sanitary service is arranged in the following manner :—

1st. For duties in the fighting-line : 4 battalion surgeons, one per infantry regiment ; 1 battalion surgeon for the rifle battalion ; 1 battalion surgeon for the divisional cavalry regiment ; 1 regimental or battalion surgeon and 1 médecin-adjoint for the divisional artillery ; 17 élèves médecins between the several units—about one per battalion ; 1 bearer sergeant per infantry regiment ; 1 bearer corporal per battalion ; 1 bearer lance-corporal for the 4 batteries ; 3 bearer privates per company or battery ; 1 soldat porte-sac d'ambulance per battalion or two batteries ; 1 soldat porte-sacoches d'ambulances per cavalry regiment.

2nd. Two postes de secours. The personnel is allotted as follows : the regimental surgeon of the divisional cavalry regiment has charge of both posts, and there are further—

4 battalion surgeons	2	for	each post.
4 élèves médecins	„		„
4 soldats porte-sac	„		„
12 sick attendants	6	„	„

The élèves médecins and the sick attendants are taken from the ambulance columns.

3rd. A dressing station, the medical staff of which comprises : the

divisional surgeon, 4 regimental surgeons, and one of the divisional ambulance columns.

4th. A flying hospital.

Forces available on Mobilization.—The following statement was made during the debates on the vote of credit:—

With the colours	51,985	men.
Active contingent, after deducting 8 p. c.	51,481	„
Reserve „ „ 21·5 p. c.	26,524	„
Total	129,990	„

This total showed a reduction of about 6 per cent. on the whole numbers borne on the rolls; but the statistics of the mobilization in 1870 showed the much larger rate of 29 per cent. reduction for all causes. A serious defect also must be taken into consideration, which is, that cadres are in existence for 100,000 men only, while the reserve, numbering nearly 300,000 men, has hardly any Officers, and would require about 900.

On mobilization each foot soldier is to carry 80 rounds of ammunition—40 in the pockets of the knapsack, 30 in the ammunition pouch, and 10 in the haversack.

Bulgaria and East Roumelia.

Infantry.—6 brigades of 2 regiments each. The regiment has 4 battalions of 4 companies, and a 17th company forms the nucleus for a depôt battalion to be formed on mobilization. The peace establishment is 1,930 per regiment; in war 4,000 men.

Cavalry.—On account of the great distances, the cavalry brigade has been dissolved. There are 3 regiments—

The 1st at Sofia, of 4 squadrons,
The 2nd at Schumla, of 5 squadrons,
The 3rd at Philippopel, of 5 squadrons.

There is, further, an escort squadron in Sofia. The estimates provide for a 4th regiment to be raised. The strength of a regiment, both in peace and war, is 600 horses.

Artillery.—3 regiments of field artillery of 6 batteries, each of 4 guns; each regiment has also a mountain division of 2 guns.

On mobilization the number of guns is doubled; the mountain divisions are formed into independent batteries of 8 guns. The formation of a 4th field artillery regiment is contemplated. There is one battery of siege artillery, with 8 Krupp 12-cm. guns.

China.

Military School.—The cadets are between 13 and 17 years of age, and the course lasts 5 years. The first 3 years are occupied with literary subjects, the last 2 with military instruction, which is conducted by retired German Officers.

The Fleet.—During 1887 important additions were made to the navy by two ironclad corvettes built in Bredow, two plated cruizers built at Elswick, and a torpedo-boat.

Railways.—In 1887 the construction of the first railway in the country was sanctioned, and is to be made by the Kaiping Company. It is to run from Taku, the port of Tientsin, 50 miles, to the Kaiping coal mines, which will facilitate the coaling of the fleet in case of necessity while covering

Pekin. From Taku a branch line will run to Tientsin, 25 miles, and a coast line will be constructed to Shanhai-kwan, 150 miles.

The sanction having been given for this work to be undertaken is a matter of no small importance. As early as 1876 a line from Shanghai to Wosung was constructed by Englishmen, but it was promptly destroyed by the superstitious natives, and since that time all attempts to obtain sanction for a similar undertaking have until now proved useless. The following further lines have now been planned:—Pekin-Tientsin-Shanghai, and Shanghai-Nankin-Canton.

Telegraphs.—The system in China has lately been considerably extended. A main line runs from the Tonkin frontier by Canton-Shanghai-Tientsin-Pekin to Kirin in Manchuria. The connection there with the Russian system will probably be effected before long. Another main line runs from Shanghai south-west by the Yangtse-Kiang by Kweitschu-Luchow-Yunnan-Keihua. It will shortly be connected with the line from the Tonkin frontier at Nanning. Numerous branch lines lead to the greater towns. Submarine lines connect the larger coast towns and lead to Japan and the Malay peninsula.

Experiments have also been made with balloons for military purposes, thus, though there is not anything material to record this year in regard to the actual armed forces of the country, there is much to show that progress is being made in China of a nature to produce one day a revolution in the modes of thought and in the organization of the army, which will immensely increase its value as a military Power.

Denmark.

In the Reports for 1886 particulars were given of various works of defence in the neighbourhood of Copenhagen. These have been proceeded with and are in the following condition:—

As regards the sea defences, the construction of batteries at Charlottenlund and Kastrup, commenced in 1886, has proceeded so far that the battery at Charlottenlund will shortly be provided with its armament, while that of the Kastrup battery, though it will not be ready until later, will be also within a comparatively short time. Amongst the land defences the preparation of works for an inundation on the north front is of the greatest moment. They have been so far completed that the inundation could be effected at short notice: the minor works which have yet to be made will be completed during the next few months. Further progress also has been made with the construction of the fort at Garderhoi, which is now surrounded on all sides with a flanked ditch secure from assault, and in which the foundations for the interior casemates, that are to carry the plated tower, have been laid. The buildings were to be constructed during the spring.

Two small batteries, each to contain four quick-firing guns under bomb-proof cover, are to flank the inundations. Both of these batteries—the east and west Ordrupkrats battery—are to be ready at the same time as the inundation and armed.

In the budget for 1887-88 a sum was also voted for the further strengthening of the field fortifications at Copenhagen. These works which were taken in hand, are divided into three groups, viz., the portion which is necessary for the works of inundation referred to above; those which are required for the construction of a further and more retired inundation; and lastly, the works for the establishment of batteries on the plateau, in front of this latter inundation.

1st. The Christiansholm line is so far a completion of the northern inundation, that it is designed to close the defile between this inundation and the

Oeresund. It forms a single straight front, stretching in a direction from west to east, from the inundation to the Sound. The flank defence of the line is provided for by the gorge caponniers of a completely closed work situated in front of the centre, which is designed to mount only armour-protected guns. The line, as well as the work, is surrounded by a wet ditch with a covered way in front of it. The whole of the masonry work is completed, and the earthworks were to be finished in the spring. The actual armoured constructions would not be ready until later, on account of which the work was to be first armed with two quick-firing guns with steel shields and flanking guns of a similar nature in the caponniers.

2nd. The southern inundation is an extension of the inundation mentioned above of the Lyngbyer meadows towards the south and west, and the flooding of the Utterslever marsh forms the last link in this chain. The inundation, which is an effective one throughout almost the entire extent, has a depth of water of over 6 feet, and will only be supplemented throughout a small portion by a wet ditch 17 yards broad, which is commanded by two batteries immediately behind it at about 300 yards distance, the Bernstorff and Gjentofte batteries, each mounting from four to eight heavy guns. All the necessary works for the southern inundation are completed, and the batteries, including bomb-proof magazines, are ready. The inundation itself, which is to be effected by means of the waters of the Furesee, can only be put in operation when the northern inundation is ready, which, as already stated, will be in the immediate future.

3rd. Disposition of batteries in front of the southern inundation. The latter forms a kind of enceinte secure from assault in front of the centre, which must be covered by advanced forts; provisionally their place is taken by batteries secure from assault in the retired artillery line. Two such batteries are being built, viz.:—

The Thinghoj battery, consisting of a closed redoubt which is provided provisionally with two quick-firing steel guns with shields and with emplacements in the open batteries for ten 12-cm. iron guns and two mitrailleuses. The redoubt will be armed later on with two heavy and two smaller guns with armoured protection, so that it will form a small armoured fort secure from assault with two adjoining batteries. The whole of the masonry—including bomb-proof shelter for about 200 men—was to be completed in January; the rest of the works in March or April last.

The Vangede battery, which was to be carried out in the same way as the Thinghoj battery, is provided with platforms for nine 12-cm. guns and two mitrailleuses, and was to be completed somewhat earlier than the other.

Besides these works the National Defence Association has begun the erection of a permanent fort south of the Lyngby-See. This forms the right flanking fort of the central position before Copenhagen, and in connection with the Garderhoj fort closes completely the section of ground between the lakes and the Sound, and at the same time flanks any advance against the central battery referred to above.

France.

During the brief period during which General Ferron was Minister of War, considerable changes were effected in the organization of the army, resulting in increased efficiency. The infantry was diminished by the 700 depôt companies, whereas the cavalry was increased by four regiments, and a new division formed; the artillery and engineers were increased; and mountain formations introduced.

Law regarding the Reorganization of the Infantry.—By a law of the 25th July, 1887, the previously existing depôt companies of the 144 line regiments and 30 jäger battalions, which were training and not fighting

units, were abolished. The utility of these companies only commenced with mobilization, and they could without difficulty be formed on the outbreak of war. These depôt formations do not exist in peace time in any of the larger armies. The 4th battalions of the 144 line regiments are also to be reduced; in order to allow of the formation of these battalions as quickly as possible on mobilization, it is only necessary to maintain a cadre of Officers. The 4th battalions, which have hitherto formed the garrisons of Paris and the fortresses of the first line, are to be replaced by 18 new regiments.

Law regarding the Creation of new Cavalry Regiments and Reduction of the 6th Squadrons in the four Chasseur d'Afrique Regiments.—This law, of the same date as the preceding one, set forth that the number and strength of the cavalry did not bear a proper proportion to the other arms. On this account provision was made in the *loi organique de l'armée* for the creation of new cavalry regiments. Of the regiments still wanting, four were ordered to be raised forthwith, viz., two dragoon regiments and two Chasseurs d'Afrique regiments, of which the latter are to replace the two Hussar regiments incorporated with the XIXth army corps, in Algeria, and the latter will then return to France. A new cavalry division will be formed from the two new Dragoon regiments, the Hussar regiments referred to above, and the 6th Cuirassier brigade, which has not hitherto formed part of any division.

The expense of these formations will be diminished by the reduction of the 6th squadrons of the four Chasseur d'Afrique regiments, and by the transfer from existing regiments to the new formations of Officers whose places will not at present be filled up.

By the law, however, the Minister of War is authorized not only to raise these four regiments, but also 9 others, viz. :—

2 Dragoon regiments,
1 Rifle regiment,
6 Hussar regiments.

The Recruiting Law.—The 1st Section of the revised *loi organique* was laid before the Chamber by General Boulanger when Minister of War in the summer of 1886, was reported upon by a Military Commission last year, and came on for general discussion in June and July. The majority approved of the principles of the law—20 years' service, of which 3 years with the colours, 6 years in the reserve, 11 years in the Territorial army; abolition of the institution of one-year Volunteers and of the division of the contingent into two portions. But the terms of Article 49, under which authority was given to dismiss soldiers after 2 years with the colours, provided they were considered to be efficiently trained, gave rise to very lively debates. The Minister of War, General Ferron, took part in them, and declared that the full 3 years should be insisted on for the entire yearly contingent. The actual increase to the peace establishment of the army would, he estimated, only amount to 36,000 men, and entail an additional cost of 18 million francs, which by new economies might be reduced to 8 millions, a sum which, with the examples of the German and Italian Parliaments before them, he urged the Chamber to vote.

The Article was rejected by a large majority; but notwithstanding this, the whole of the 1886 contingent was incorporated in the active army for three years, and the previous separation of the contingent into two portions avoided.

Proposed Law regarding the Formation of Mountain Troops.—The draft Bill put forward, set forth the necessity of having special troops, accustomed to marching and manœuvring in mountainous country, for the security and defence of the portions of the frontier of this nature. It was

proposed to form 12 Rifle battalions each of 6 companies, and 12 Mountain Batteries to be attached one to every battalion. At the same time the number of Rifle battalions incorporated in the army corps was to be reduced from 30 to 18. The strength per battalion was fixed at 960 Officers and men with 57 horses or pack animals. The artillery was to be organized in two regiments, each of 6 batteries.

The Committee of the Chamber did not report in favour of two groups of rifle battalions for separate services being formed, but recommended that the whole of the existing rifle battalions should be raised from four to six companies. In the first place the battalions situated on the Italian frontier are to be raised as recommended, and furnished with the clothing and arms specially adapted to mountain service. The formation of 12 mountain batteries formed in two regiments was also approved.

Proposed Law regarding Alterations in the Organization of the Artillery and of the Train.—The first Article refers to the formation of the Mountain artillery already referred to. The next two provide for the cancelling of the law of the 24th July, 1883, under which 12 batteries were detached to Algeria, and for these batteries as well as others required for Tunis, Tonkin, &c., being organized in two new regiments, each of 10 batteries (6 mountain, 2 field, and 2 garrison). Other Articles deal with the reduction of the two previously existing pontoon regiments, of which 9 companies were to go to the Artillery and 19 to the Engineer battalions, and with the formation of 19 new Train companies for horsing the bridge equipage.

The Military Committee approved of all these measures excepting the last, in place of which it recommended 15 Engineer train companies.

Proposed Law regarding the Organization of the Engineers.—The object of the changes advocated is to simplify the duties of the Engineers upon whom the maintenance of the communications has devolved, and to which is now to be added the construction of bridges. It is, therefore, proposed to add 19 companies of the pontoon regiments to the 4 Engineer regiments, which will each be reduced by 1 company per battalion (except the 20th Battalion), by the company of railway workmen, and the depôt companies.

The number of railway companies being considered insufficient, a 5th Engineer regiment, to be called the Railway regiment, is to be formed of 3 battalions, each of 4 companies, and 1 driver company.

The Committee of the Chamber approved of the formation of a Railway regiment, and recommended the new formation of 15 Engineer driver companies, and of 1 Engineer battalion for Algeria, the former in place of the 19 train companies, as already noticed. The strength of the Engineer regiment was to be 63 Officers, 2,034 men, and 73 horses.

Distribution of Fortified Places for the Purposes of Command.—By a decree of the 28th of December, 1886, a redistribution of commands was effected. The superior commander in each case is placed under the control of the Army Corps commander and the authority of the Minister of War. He is designed to be, in the event of hostilities, the Governor of the most important of the places in the group under his command, and territorial commander of the subdivision placed under him.

The following is the distribution :—

Army Corps.	Place of the Superior Commander for Defence.	Fortresses.
I.	Paris	Paris.
	Lyons	Lyons.
	Maubeuge	Maubeuge, Valenciennes, Condé, Bouchain, Le Quesnoy, Cambrai, Forts de Moulde and Flinas.
	Lille	Lille, Douai, Arras.
	Dunkirk	Dunkirk, Montreuil, Bologne battery, St. Omer, Aire.
II.	Laon	Laon, La Fère, Peronne, Guise, Forts Hirson, Montférault, Laniscourt, Bruyères, Malmaison, Condé sur Aisne.
VI.	Verdun	Verdun, fortifications on the Meuse from Fort Génicourt to Gironville.
	Toul	Toul, fortifications between Frouard and Pagny la Blanche Côte.
	Epinal	Epinal, fortifications on the Upper Moselle from Fort d'Arches to Fort Bourlemont.
	Rheims	Rheims, Rocroi, Givet, Montmédy, Longwy, Fort des Ayailles.
VII.	Belfort	Belfort, Barrier Forts du ballon de Servance, Giromany, la Chaux, Mont-Bard, Lomont.
	Briançon	Briançon, fortifications from Fort Lomont to Fort les Bancs.
VIII.	Langres	Langres.
XIV.	Besançon	Besançon, Mont Dauphin, Forts Queyras, St. Vincent, Tournaux, Sisteron.
	Grenoble	Grenoble and the Alpine forts.
XV.	Nice	Nice, Antibes, Entrevaux and forts.
	Corsica	All the fortifications of this island.
XVI.	Perpignan	Perpignan, Cette, Port Vendres, and the Pyrenean forts.
XVIII.	Bayonne	Bayonne, Lourdes, Fort Socoa, and the Pyrenean forts.
XIX.	Algiers	All the fortifications in Algeria.

By a decree of the 4th April, 1887, a superior Officer of Artillery, one of Engineers, a medical Officer, and an official of Intendance, were ordered to be attached to each of these Commandants.

Railways.—The total extent of the lines constructed was, on the 1st February, according to official data, 20,584 miles, of which the greater extent is held by the six large railway companies; only about 1,500 miles are the property of the State.

The rolling stock available on the same date was—

8,855 engines,
19,080 passenger carriages,
227,780 goods carriages, vans, and lorries.

The personnel employed numbered 241,000 persons, of whom 18,900 were women ; 113,800 had been soldiers.

Military Budget.—The amount voted for 1887 was 555,934,529 francs, but this sum was subsequently subjected to a reduction of 4,402,191 francs, principally on the Votes for provisions and forage.

The total expenditure for replacing war matériel was fixed by the laws of the 19th March, 15th July, 1885, and of the 8th August, 1881, at a sum of 2,293,971,451 francs, which was reduced eventually by 10,138,168 francs.

The last instalment of this sum, amounting to 105,000,000 francs, was applied in 1887. The distribution of the total amount over the several votes was as follows :—

1.	Artillery	1,226,045,337 francs.
2.	Engineers	650,311,569 „
3.	Provisions	78,634,411 „
4.	Hospitals	19,391,583 „
5.	Remounts and harness	26,477,000 „
6.	Clothing	239,619,022 „
7.	General transport expenses	26,249,692 „
8.	War depôt	12,398,200 „
9.	Indemnification for arms delivered up	706,750 „
10.	Central administration	199,713 „
11.	Subsidies to the general charge fund of the troops	3,800,000 „

The extraordinary credits in 1887 amounted to 86 millions, of which 71 millions were for the re-arming of the infantry, and 15 for fortifications and barracks.

The War Ministry.—In consequence of the removal of the War Depôt as a sub-branch of the War Minister's General Staff, the creation of a branch for military telegraphs and ballooning, the abolition of the post of Under-Secretary of War, and changes in the establishments, the following new distribution was adopted by a decree of the 24th May, 1887 :—

Distribution.	Chief of the Staff.	Chief of the cabinet, sub-chiefs of the staff, assistant directors.	Heads of branches.	Assistant heads of branches.
Minister's Cabinet	..	1	..	..
1st Branch.—Cabinet and registry	..	..	1	2
2nd Branch.—Correspondence, decorations	..	..	1	2
Personal matters connected with General Officers	..	..	1	1
3rd Branch.—Personnel of the central administration	..	..	..	1
Section for matters concerning aid to the civil power	..	..	..	1
War Minister's General Staff	1	2	..	..
Branch dealing with the General Staff personnel	..	..	1	1
Branch dealing with administration of matériel and accounts	..	..	..	1
1st Branch.—Organization, mobilization	..	..	1	..

Distribution.	Chief of the Staff.	Chief of the cabinet, sub-chiefs of the staff, assistant directors.	Heads of branches.	Assistant heads of branches.
2nd Branch.—Statistics, foreign armies (with historical section)	..	..	1	2
3rd Branch.—Operations, training	..	..	1	..
4th Branch.—Line of communications, railways, transport of troops	..	..	1	..
Direction of Control	1	1	..	..
Services of exterior control ..	..	..	..	1
Services of central control ..	..	..	..	1
1st Branch.—Estimates	..	..	1	2
2nd Branch.—Audit and liquidation	..	..	1	2
3rd Branch.—Funds and orders for payment	..	..	1	1
Interior Services	..	..	..	..
1st Branch.—Pensions	..	..	1	1
2nd Branch.—Material of the central administration ..	..	1	1	1
3rd Branch.—Archives of the administration	..	..	1	2
Direction of the Infantry	1	1	..	..
1st Branch.—Personnel	..	..	1	2
2nd Branch.—Training, schools	..	..	1	1
3rd Branch.—Recruiting ..	..	..	1	2
4th Branch.—Reserves and territorial army	..	..	1	1
Direction of the Cavalry	1	2	..	..
1st Branch.—Personnel	..	..	1	1
2nd Branch.—Remounts ..	..	..	1	1
3rd Branch.—Gendarmerie ..	..	..	1	2
4th Branch.—Military Law ..	..	..	1	2
Direction of the Artillery	1	..	..	..
1st Branch.—Personnel ..	..	..	1	1
2nd Branch.—Matériel	..	..	1	2
Direction of the Engineers ..	1	..	..	..
1st Branch.—Personnel	..	..	1	1
2nd Branch.—Matériel	..	..	1	1
Direction of the Administrative Services	1	2	..	..
1st Branch.—Personnel and military beds	..	..	1	2

Distribution.	Chief of the Staff.	Chief of the cabinet, sub-chiefs of the staff, assistant directors.	Heads of branches.	Assistant heads of branches.
2nd Branch.—Provisions ..	..	..	1	1
3rd Branch.—Forage and fuel ..	..	..	1	1
4th Branch.—Supply of money..	..	..	1	2
5th Branch.—Transport and travelling expenses	..	..	1	2
6th Branch.—Clothing and equipment	..	..	1	2
Direction of powder and saltpetre factories	1	..	..	..
1st Branch.—Personnel and matériel	..	..	1	1
Direction for sanitary services ..	1	..	..	..
1st Branch,—Personnel and matériel	..	..	1	3

The war depôt, which was previously attached to the 4th Branch of the General Staff at headquarters, has been enlarged, and is now placed as a special branch termed the "Geographical Service." It is subdivided into sections for geodesy, survey, topography, cartography, construction of relief plans, and a depôt for instruments. A General or Colonel is the Director, and 13 Officers and 1 adjoint belonging to the Engineers are attached to him, the senior Officer acting as Assistant Director. The civilian staff consists of 35 engravers, 40 draughtsmen, 1 modeller, 1 painter, and 12 subordinates.

The matters connected with telegraphs, ballooning, and the pigeon post service, which were previously dealt with also in the 4th Branch of the General Staff, have been also formed into a special Direction. A senior Officer, with the title of Director, is in charge of it, assisted by the necessary staff of Officers and officials.

The "Annuaire" for 1887 gave the numbers of the Officers and officials, exclusive of the Officers of the headquarter General Staff and of the Minister's personal staff, who were employed in the several Directions, and the technical sections attached, as 107 Officers, 15 medical Officers, and 137 superior officials. The law of the 24th May, 1887, fixed the number of officials and their assistants in the several branches at 393, and the subordinate officials (servants, porters, &c.) at 136.

Composition and Organization of the Infantry.—Under the new law of the 25th July, 1887, the infantry is organized in the following manner:—

162 regiments of the line, numbered from 1 to 162, each of 3 battalions of 4 companies; the regiments 1 to 144 have besides a supplemental cadre of 9 Officers for a 4th battalion, to be formed in the event of mobilization.

30 rifle battalions, each of 4 companies; 4 Zouave regiments, each of 4 battalions of 4 companies, and 2 depôt companies per regiment.

4 Algerian tirailleur regiments, each of 4 battalions of 4 companies, and 1 depôt company per regiment;

3 battalions of African light infantry of 6 companies, 2 foreign regiments

of 4 battalions of 4 companies, and 1 depôt company per regiment; to which must be added—

5 regiments of Tonkin tirailleurs; 4 Annamite rifle battalions.

The composition of the regiments 1 to 144 is the following:—

Regimental Staff.

1 Colonel with 2 horses.
1 Lieutenant-Colonel with 2 horses.
1 Major with 1 horse.
1 Surgeon-Major, 1st class, with 1 horse.
1 Captain as Paymaster.
1 Clothing Officer.
1 Lieutenant as assistant to the Paymaster.
1 Sub-lieutenant to carry the colours.
2 Surgeons with 2 horses.
1 Bandmaster.

Subordinate Regimental Staff.

1 Drum-major.
1 Pioneer corporal.
12 Pioneers.
1 Assistant to the Bandmaster.
38 Musicians.

Section not in the Ranks.

1 Adjutant wagon-master.
1 Armourer.
1 Fencing instructor.
4 Sergeants (Clerk, Quartermaster, Clothing Store).
9 Corporals (clerks, tradesmen, &c.).
16 Privates (clerks, tradesmen, &c.).

Establishment of the Supplemental Cadre.

1 Battalion Commander with 1 horse.
4 Captains with 4 horses.
4 Lieutenants.

Staff of a Battalion.

1 Battalion Commander with 1 horse.
1 Captain Adjutant-Major with 1 horse.

Subordinate Battalion Staff.

1 Adjutant.
1 Corporal (drummer or bugler).

A Company.

1 Captain with 1 horse.
1 Lieutenant.
1 Sub-lieutenant.
1 Adjutant.
1 Sergeant-major.
1 Quartermaster-sergeant.
4 Sergeants.
8 Corporals.
2 Drummers or buglers.
108 Privates.

Total Establishment of the Regiment.

62 Officers and Medical Officers with 31 horses.
295 Non-commissioned officers, corporals, and men of the cadres.
1,296 men.

The remaining regiments, 145 to 162, have no supplementary cadres, and have only 51 Officers and 264 N.C.O's. and men belonging to the cadres; there is no difference in the number of men in the ranks.

The Rifle battalions have an independent formation:—

Battalion Staff.

1 Battalion Commander with 1 horse.
1 Captain-Major with 1 horse.
1 Captain-Adjutant-Major with 1 horse.
1 Lieutenant as Paymaster with 1 horse.
1 Clothing Officer with 1 horse.
2 Medical Officers with 2 horses.

Subordinate Staff.

1 Adjutant.
1 Sergeant-major (bugle-major).
1 Corporal bugler.
1 Armourer.
1 Sergeant-major (wagon-master).
1 Adjutant or sergeant (fencing instructor).

Section not in the Ranks.

3 Sergeants (Clerk, Quartermaster-sergeant, Clothing Store).
5 Corporals (clerks, tradesmen).
6 Privates (clerks, tradesmen).

A Company.

1 Captain with 1 horse.
1 Lieutenant.
1 Sub-lieutenant.
1 Adjutant.
1 Sergeant-major.
1 Quartermaster-sergeant.
6 Sergeants.
12 Corporals.
4 Buglers.
108 Privates.

Total Establishment of a Battalion.

19 Officers.
120 Non-commissioned officers, corporals, and men of the cadres.
432 Privates.

Military Training.—The portion of the year to be utilized for training and instruction extends over 10½ months, divided into 4 periods :—

1st period 3½ months. Individual training of the recruits, drill in squads and half-sections ; completion of the instruction of the old soldiers.
2nd period, 2½ months. Section, peloton and company drill.
3rd period, 2½ months. Battalion and regimental drill.
4th period, 2½ months. Large manœuvres ; training of the recruits.

The Captain conducts on his own responsibility the training of his company in every branch of instruction ; the superior Officers hold inspections and examinations, and keep themselves constantly acquainted with the state and progress of the instruction.

1st period. Individual instruction, garrison guard duty, gymnastics, preparatory exercises in firing and field duties. The theoretical instruction will be based on a manual prepared by the Captain and approved by the battalion commander, and imparted on the exercise ground. Whenever the opportunity offers of raising the moral qualities of individuals, it should be taken advantage of ; respect for the uniform, love of country and colours, being inculcated. At this time most of the old soldiers will be on furlough ; those present will be occupied in drilling the men called up for exercise and in completing their previous instruction.

2nd period. Company training, field duties, night exercises, firing, gymnastics, fencing and boxing, judging distance, execution of field works, route marching.

3rd period. Battalion drill, exercises in field duties and firing, drill of the regiment in close order, at the most five times.

4th period. Company and battalion exercises over ground which could not be undertaken earlier on account of the crops ; attack and defence of fortified positions ; exercises in field duties in combination with other arms, manœuvres.

The artificers, clerks, and musicians, who, in the event of a mobilization return to the ranks, must not be withdrawn before the end of the 2nd period, and must take part in at least two drills a-week during the third and 4th periods.

Cavalry.—By the law of the 25th July, 1887, the 5th or depôt squadrons are to be reduced, and 13 new regiments formed. The reorganization having been limited at the outset to the creation of two new Chasseurs d'Afrique regiments (5th and 6th), and two new regiments of Dragoons (27th and 28th).

These were formed, the former by the 6th squadrons transferred from the existing four Chasseurs d'Afrique regiments, and by the 3rd, 4th, and 5th squadrons of the 2nd and 4th Hussar regiments previously stationed in Algeria, and the latter by the transfer of squadrons from existing Dragoon regiments. The two Hussar regiments were completed to four squadrons by transfers from other Hussar regiments, and these, together with Dragoon regiments from which squadrons were taken, were completed in their turn by the incorporation of their 5th or depôt squadrons.

The new establishment of a cavalry regiment was fixed at the following strength :—

Staff.

1 Colonel or Lieutenant-Colonel	3 horses.
2 Commandants (including 1 Major)	4 „
1 Lieutenant as Standard-bearer and Provision Officer	1 horse.
1 Officer as Paymaster	1 „
1 „ Assistant Paymaster	1 „
1 „ for Clothing Officer	1 „
2 Surgeons	2 horses.
3 Veterinary surgeons	3 „

Subordinate Staff.

3 Adjutants	3 horses.
1 Adjutant in charge of transport	1 horse.
1 Trumpeter maréchal des logis	1 „
1 Brigadier (trumpeter)	1 „

Subdivision not in the Ranks.

7 Maréchaux des logis (secretaries, artificer, fencing master).
11 Corporals (clerks, artificers).
17 Privates, amongst whom are 7 drivers with 14 horses.

A Squadron.

1 Captain	1 horse.
1 1st Lieutenant	1 „
3 2nd Lieutenants	3 horses.
1 Maréchal des logis chef	1 horse.
6 Maréchaux des logis	6 horses.
1 Farrier	1 horse.
12 Corporals	12 horses.
4 Shoeing smiths, 1 being a corporal	4 „
4 Trumpeters	4 „
122 Privates	104 „

The total strength of a regiment is consequently—

37 Officers	41 horses.
182 Non-commissioned officers and men of the cadres	161 „
610 Men	520 „

There is a reduction of three superior Officers, viz., 1 Lieutenant-Colonel, 1 squadron commander, and 1 Officer instructor.

It has been pointed out that looking to the necessity for squadrons taking

the field with 150 horses, the most urgent requirement at present is to increase the number of horses allowed in peace, particularly in the 44 regiments with the cavalry divisions and army corps stationed nearest to the frontier which are supposed to be on a war footing.

The Mobilization of the 17th Army Corps.—The 17th corps, the headquarters of which is at Toulouse, consists of the 33rd and 34th infantry divisions, the 17th cavalry and 17th artillery brigades, the 17th engineer battalion, and the 17th train squadron; the 29th chasseur battalion was detached with the brigade of occupation in Tunis, and only its depôt company was in the corps district.

The decision to mobilize the corps became known owing to an indiscretion of the "Figaro" newspaper on the 24th August, and on the 30th of the same month the order was sent by telegraph: "Mobilization of the 17th army corps; the 31st August is the first day of mobilization." At the same time a Notice was posted in all the public places calling upon all soldiers of the 17th corps who were *en disponibilité* or belonged to its active reserve to join at the stations, and on the day and hour noted in their military passes.

The scope of the mobilization was also prescribed in the Notice; it was to embrace the completion of the staffs, branches, and formations of the corps, and the requisition of horses, wagons, and harness for their completion. The Territorial army and the navy were exempted from its operation.

The mobilization took place in accordance with the arrangements for this operation. The reservists arrived on the 1st September at the depôts of their corps, to which they were sent after being clothed. On the 3rd day of mobilization 41 committees were occupied with obtaining the horses requisitioned, and 17 committees with the wagons; their duties were concluded early on the 5th day, by which time more horses had been requisitioned than were actually required.

During the night of the 1st to the 2nd September (2nd and 3rd days of mobilization) the entrainment took place at Montauban of the 17th cavalry brigade and the 10th Dragoons, and at Arch of the 9th Chasseurs. Each regiment occupied three trains, and the entrainment and detrainment were effected rapidly and with order. These regiments were not at their full strength when they moved, but were completed on the 4th day of mobilization by the arrival of their reservists and extra horses.

On the 5th day of mobilization (the 4th September) the actual mobilization was completed, and the concentration of the infantry, artillery, &c., was commenced by their transport from their garrisons to the manœuvring ground between Castelnaudary and Carcasonne. The railway transport was conducted by a line committee; railway commandants were appointed, and all the necessary preparations had been made for the entrainment and detrainment to be carried out as rapidly as possible. The entrainment of a battalion occupied three-quarters of an hour, and of a battery 1½ hours. The number of trains required for the transport of the army corps was 110; it was completed on the 12th day of mobilization.

The total strength of the army corps was 36,447, with 102 guns (17 batteries), 2,036 wagons, 10,441 horses, and 195 mules.

Amongst the weak points which the mobilization brought to light were the unsatisfactory quality of the horses requisitioned, which proved unequal to the work required, and the slow progress in obtaining the horses. The maps issued to the Officers were faulty, and serious well-grounded complaints were made of the Intendance as regards the supply of the troops.

The troops completed their mobilization within the prescribed 4 days; the coming up and clothing of the reserves, the appointment of new officials, and the formation of columns and trains were carried out as intended. But it must not be overlooked that this was effected under conditions that would

not obtain in case of war, owing to the 5 days' notice being available in which to make preparations—a contingency that could not ordinarily be reckoned upon.

Training of the Territorial Army.—The training was divided into two periods: the first from the 21st March to the 2nd April, and the second from the 18th to the 30th April. During the first period there were exercised 38 battalions, 88 garrison batteries, 49 sortie batteries, 32 field batteries, 37 ammunition and park sections; and during the second period 185 battalions and 11 garrison batteries. The nature of the training is definitely laid down, and instruction in detail restricted, the greater portion of the time being reserved for exercises in fighting formation, in firing and field duties. On the 10 forenoons of the training period there are 6 drills in detail and company, and 4 battalion drills in close order; besides these an hour is set apart for the preparatory instruction before ball-firing. The afternoons are employed in exercises of 4 hours' duration in fighting formations, in firing and field duties.

Hitherto the Territorial artillery called up for training have not been exercised in target practice. In future 190 rounds are to be allotted to each artillery regiment for this purpose. When batteries called up for training are near an artillery practice ground they will fire their ammunition there. When this is not the case the Officers only will be detached to the nearest practice ground and there superintend the firing of the 190 rounds allotted to their battery by the artillery on the spot.

Italy.

Strength of the Army and Militia.—The total strength of the armed forces, including Officers, on the 30th June, 1887, was 2,602,665, made up as follows:—

Officers of every category		32,437
Men belonging to the active army		871,464
" "	mobile militia	295,674
" "	territorial militia	1,403,090

Of the active army there were—

Present with the colours	230,792
Dismissed to their homes	640,672

Organization of the Infantry.—By a law dated the 23rd June, 1887, the infantry is to consist of infantry of the line, Bersaglieri, Alpine regiments, District troops and disciplinary Companies.

The entire infantry forms 346 battalions with 1,371 companies; the 87 districts have 98 permanent companies, out of which garrison troops will be formed on mobilization.

The most important portion of the new law is that relating to the increase and reorganization of the Alpine troops. They form 7 regiments (22 battalions, 75 companies and 7 depôts) of the active Army, 22 companies of Mobile militia and 22 battalions of Territorial militia.

Cavalry.—The new law provided for the creation of an additional brigade staff and two new regiments. The cavalry, with these additions, consists of 24 regiments formed into 9 brigades, and there are 6 remount depôts. A Lieutenant-General or Major-General is appointed Inspector-General of Cavalry.

Artillery.—The following is the distribution under the new law:—

Field artillery—
12 regiments with the divisions (each of 2 divisions of 4 batteries 1 company train and 1 depôt).
12 regiments with the army corps (each of 2 divisions of 4 batteries, 2 companies train and 1 depôt).
Horse artillery—
1 regiment (3 divisions each of 2 batteries, 1 division train of 4 companies, and 1 depôt).
Mountain artillery—
1 regiment (3 divisions each of 3 batteries and 1 depôt).
Fortress artillery—
5 regiments (2 of 4 divisions of 4 companies and 1 depôt, 3 of 3 divisions of 4 companies and 1 depôt).
Artillery artificers—5 companies.
Artillery veterans—1 company.

This reorganization entailed the addition of 6 new batteries to each of the 12 previously existing regiments. The new regiments will have 6 guns each (in place of 8 as hitherto), which gives 96 guns to each army corps. Of these 72 will be heavy (9-cm.), and 24 light (7-cm.) which is a considerable increase in heavy guns over the previous proportion, viz., 3 to 2.

The horse artillery received an addition of 2 new batteries on its formation as a separate regiment. Its batteries had previously been placed under the administration of the 8th Artillery regiment. In the same way the mountain artillery, previously attached to the 14th and 16th Artillery regiments, was increased by one battery and formed into a regiment by itself. The Fortress Artillery regiments, 13 and 14, each received 4 new companies.

The whole of the artillery is placed under a Lieutenant-General as Inspector-General, and there are inspectors, either Lieutenant- or Major-Generals, for the horse, field, and fortress artillery respectively, and for the matériel and factories.

Engineers.—The law of June, 1887, has also made important changes in the organization of the Engineers. The corps is now to have the following constitution :—There are 4 regiments. Of these the two first consist each of 6 divisions of 3 companies, 1 division of train of 2 companies and 1 depôt. The 3rd regiment is composed of 3 sapper divisions forming together 7 companies, 3 telegraph divisions forming together 6 companies, 1 specialist company, 1 train division of 3 companies and 1 depôt. The 4th regiment consists of 3 divisions of pontonniers together 8 companies, 1 railway division of 4 companies, 1 Lagoon division of 2 companies, 1 train division of 3 companies and 1 depôt. The whole are placed under a Lieutenant-General as Inspector-General of Engineers ; there are besides inspectors of engineer troops and of engineer territorial Directions, fortresses and buildings respectively, who are Lieutenant- or Major-Generals.

In order to give effect to this organization three new division commands and 4 sapper companies were added to the 1st and 2nd regiments ; 3 new division commands, 3 sapper and 1 specialist company (balloon, traction-engine, and pigeon post services) to the 3rd regiment, and 2 new division commands to the 4th regiment, to which also 4 railway companies were transferred from the 3rd regiment, which received from the 4th 1 train company.

By the additions to and reorganization of the cavalry, artillery, and engineers described in the preceding pages, the reconstitution of the Italian Army may be said to have been practically accomplished.

Mobile Militia.—The strength was, exclusive of 2,914 Officers, 295,694 on the 30th June, 1887, of whom 152,595 belonged to the 1st category and

148,090 to the 2nd. The 1st category of the classes of 1855, '56, '57 of infantry, bersaglieri, and Alpine troops were called up on the 26th September for 10 days' drill. They were formed in 16 battalions of from 3 to 6 companies, 12 companies of bersaglieri, and 22 Alpine companies, together 22,000 men.

The following formations are included in the mobile militia :—

Infantry—
44 infantry regiments, each of 3 battalions of 4 companies.
18 bersaglieri battalions, each of 4 companies.
22 Alpine companies.

Artillery—
13 divisions of field artillery of 4 batteries.
14 train companies.
36 fortress artillery companies.
3 divisions of mountain artillery, each of 3 batteries.

Engineers—
7 sapper divisions, making together 21 companies.
2 companies of railway troops.
3 „ telegraphists.
4 „ pontonniers.
1 „ Lagunari.
4 „ train.

Sanitary and supply troops—
12 companies.

Sicilian contingent—
1 field artillery division with 1 train company.
2 fortress artillery companies.

Sardinian special militia—
3 infantry regiments, each of 3 battalions of 4 companies.
1 bersaglieri battalion of 4 companies.
1 squadron.
1 field artillery division of 2 batteries and 1 train company.
1 engineer, 1 sanitary, 1 supply company.

By the organization law of 1887, the mobile militia may in war be formed as required, either in independent brigades, divisions, &c., or in combination with the formations of the active army.

Territorial Militia.—The strength on the 30th June, 1887, was 5,390 Officers and 1,403,000 men, divided into three categories : the 1st comprised 300,203 men, the 2nd, 256,530, and the 3rd, 845,957. Of these numbers 697,806 men had not received any military instruction whatever. About 10,000, formed in 19 battalions, were called out in 1887 for 10 days' training.

The following is the organization of the territorial militia :—

320 infantry battalions, each of 4 companies.
22 Alpine battalions in 75 companies.
100 fortress artillery companies.
30 engineer companies, with 6 division commands.
13 sanitary and 13 supply companies.

These troops are to be employed primarily as garrisons of the fortresses and fortified places ; but in case of necessity they may be used for any other purpose for which they may be required.

African Special Corps.—As a result of the Italian occupation of Massowah, and the contemplated operations in Abyssinia, a credit was taken for the formation of a separate contingent for service there, which was formed as an integral portion of the active army.

The following was the organization adopted :—

2 infantry regiments of 3 battalions of 4 companies.
1 squadron of cavalry.
2 divisions of artillery, each of two companies.

The companies are employed in part as fortress (2), in part as field (1), and in part (1) as mountain artillery.

1 engineer company.
1 sanitary „
1 supply „
1 train „

Making a total of 238 Officers and 4,762 men.

In October, 1887, a new African brigade was also formed consisting of the following :—

6 battalions infantry.
2 „ bersaglieri.
1 field battery.
1 mountain battery with ammunition column.
1 engineer company.
2 train companies.
1 sanitary company.
1 supply „

These formations are separate from the garrison of Massowah and Assab, which comprise :—

At Massowah—
8 battalions (1 bersaglieri, 6 infantry, 1 Alpine).
1 squadron.
3 artillery companies.
2 sections of mountain artillery.
3 engineer companies.
68 Buluks (of 25 men) Bashi-Bazouks.

At Assab—
1 infantry battalion of 3 companies.

The total strength of the expeditionary force amounted at the beginning of the year to 710 Officers, 17,630 regular troops, and about 1,700 Bashi-Bazouks.

Austria-Hungary.

The year 1887 began and ended in serious political conditions that entailed an increased military activity. The construction of extensive barrack accommodation was undertaken at Cracow, Przemyszl, Jaroslav, and many other points in Galicia, in which considerable quantities of provisions were stored, in view of an eventual advance of the army. Special credits were accorded to the Governments by the Assemblies both in Vienna and in Buda-Pesth, in February, for the purpose of increasing the reserve stores of the Landwehr in clothing, arms, accoutrements and field equipment, and of establishing at

the station of each landwehr battalion a special equipment depôt for the battalions (in Hungary also for the squadrons) of the Landsturm. These undertakings took months to complete, and they were hardly completed when the increase of the Russian troops in the neighbourhood of Galicia and Bukowina compelled the Austro-Hungarian military authorities to take a series of fresh precautionary measures, with a view to ensuring the march of the armies being carried out, even in the bad season, without interruption or delay, and especially to secure, at least in part, the exposed Galician frontier from the inroads of the Russian cavalry.

The two divisions of horse artillery batteries quartered in the vicinity, which had in February been ordered to be placed on a war strength and their wagon trains made up, were completed, and the infantry regiments and rifle battalions of the 1st corps (Cracow) and the 11th corps (Lemberg) were placed on an increased peace strength by calling up a portion of their reserve men. The cavalry division of the 11th corps was also strengthened by the addition to it of a dragoon regiment, and the technical troops of both corps were increased by a number of engineer and pioneer companies. In addition to the provision depôts established in the spring, extensive barracks were erected in the sphere determined upon for the concentration of the army. The establishment of large stores of warm underclothing and the further increase of reserve supplies of oats, meal, biscuit, preserved meat, bandaging and other sanitary material, in combination with technical preparations at the more important railway stations, completed measures already taken in the spring for preparing Galicia and Transylvania to be the base of operations of the field army.

Besides these preparations within the Empire, the most important events have been the introduction of a small-bore magazine-rifle, the issue of new regulations regarding field duties, the completion of the organization of the railway and telegraph regiment, the reorganization of the War School, the increase in the number of superior Officers in the infantry and medical services, the increased status given to the train, and the further development of the landwehr and landsturm organizations.

Strength of the Armed Forces at the Commencement of 1887.

General and combatant Officers of the army				19,480
Non-combatant Officers and officials				7,968
Men belonging to the army				881,746
Total strength of the Austrian landwehr				246,000
Officers of the Hungarian Honvéd infantry				2,483
Men	,,	,,	,,	199,309
Officers	,,	,,	cavalry	380
Men	,,	,,	,,	25,806
Total regular army and landwehr				1,383,172

This number by no means exhausts the organized formations of the Austro-Hungarian forces. For as a result of the landsturm law of the preceding year 10 and 18 yearly classes respectively have to be taken into account. Of these the men of the 1st category, viz., those who have not yet served (temporarily released) between 19 and 37 years of age, and those who have served between 33 and 37 years of age belong, part to the reserve for the war formations of the army and the landwehr, part to the formation of the marching battalions which are destined to be employed on the lines of communication and in the rear of the field army. If, therefore, the men of the 2nd category (from 38 to 42 years of age) be excluded, who would only be called up in extreme emergency for employment in territorial battalions for

garrison duty in the interior, the armed forces recapitulated above would receive a material increment of about 516,000 men, for whom arms and clothing are kept ready partly in the army augmentation-magazines and partly in the landwehr depôt stores. Finally, the local Bosnia-Herzegovina formations have to be reckoned, which include 7,000 men, the number of whom will increase yearly until the full proportion to the 1,358,000 inhabitants of these provinces is completed.

Nationality of the Men composing the Regular Army.—A serious drawback to the cohesion of the army as a whole is the mixed nationality of the men, which is shown by the following figures :—

		Per 1,000.
Germans	264,935	= 301
Magyars	166,117	= 188
Czechs and Moravians	124,378	= 141
Slovacs	41,256	= 47
Poles	70,371	= 80
Ruthenians	72,142	= 82
Slovenians	26,538	= 30
Croatians and Servians	62,202	= 71
Bulgarians	156	= ....
Rumanians	46,313	= 52
Italians	7,338	= 8

Change in the Pattern of Magazine-rifle.—The Männlicher magazine-rifle of 11-mm. bore was adopted in 1886, and a first consignment, numbering 85,000, was actually completed and the arms issued to the troops composing the 9th and 10th corps respectively. Increased experience and further experiments, however, subsequently led the Committee that had charge of the trials to report strongly in favour of the introduction of an arm having a smaller bore. The result was that the manufacture of the former pattern was stopped, and a rifle on the same system but with an 8 mm. bore was adopted. The advantages claimed for the new arm are an increased initial velocity of 500 m. in place of 480 m. and a material reduction in weight, which will admit of 9,600 rounds being carried in a company ammunition wagon in place of 7,000 of the 11 mm. calibre.

At the same time that the two army corps referred to were supplied with the magazine-rifle they received also the new pattern two-horsed ammunition wagon. Whereas hitherto there was but one ammunition wagon to each two companies, there is now to be one per company. The infantry equipment has also undergone considerable modifications, with a view to distributing the weight more easily ; there are two ammunition pouches in front and a large one covered with calf's hide behind for the reserve ammunition ; the haversack has been made waterproof. By a reduction in the weight of the equipment 30 rounds more of ammunition and another complete ration of preserved meat is carried without any increase of weight in the aggregate.

Completion of the Strategic Line over the Carpathians.—By the opening of the line of railway Munkács-Beskid-Strij, five lines are available for the transport of troops from the interior of the monarchy into Galicia. By means of them it is possible to concentrate within a space of three weeks in two groups in Galicia, inclusive of the two corps stationed in that province and in Bukowina, 32 infantry and 5 cavalry divisions (576,000 men).

The Railway and Telegraph Regiment.—A new regulation has been published regarding the organization of the railway and telegraph regiment. There is not much change from its previous constitution, only in war the regiment abandons the battalion organization and forms 45 field telegraph and 3 mountain telegraph sections in place of 43 as before, so as to correspond

to the increased number of infantry divisions. The duties of the field railway and telegraph formations in war are also more strictly defined.

The field railway service embraces all matters connected with the military employment of the line, especially the re-establishment or construction of lines within the theatre of war, the arrangement and execution, working of the traffic on the occupied or newly constructed lines, and lastly, the direct co-operation with the movements of the troops; outside the theatre of war, the regulation of the traffic and military transport on the lines in the rear of the army. A superior Officer of the general staff is nominated "Chief of the field railway service," who is placed under the commander of the army through the chief of the staff. Under the Chief or Director of Railways are placed—

1st. For the lines inside the theatre of war, the field railway Managements, with the Line and Etappen Committees, for the regulation of the military transport; the military railway Directions with the traffic inspections and working detachments for carrying on the traffic of the occupied lines; the railway companies for the repair and extension of the lines and laying new lines, or for the destruction of the existing lines.

2ndly. For the lines outside the theatre of war, the central railway management, with the Line and Etappen Committees, for the regulation of military transport.

To the Director of field railways are attached the regimental commandant and one battalion commandant of the railway and telegraph regiment with their adjutants; some general staff Officers; the superior Officers of the engineer staff and of the railway and telegraph regiment belonging to the railway section of the general staff.

The arrangement and conduct of the traffic of the occupied lines are either placed under the adjoining lines from the interior, the personnel being increased, or in the case of large systems of occupied lines they may be taken over by special military railway Directions. These are composed of a Staff Officer as a Director who is responsible for the traffic and administration of the lines placed under him; 2 railway constructive engineers; 2 railway traffic engineers; 1 engine technical official; 1 administrative official for the control of the several branches: communication, construction, maintenance of the line, the expedition of trains, workshops and material.

The field telegraph service is charged in war with establishing the necessary telegraphic communications and stations, placing them in working order, and, if necessary, with disconnecting them again, with converting to their own use the enemy's lines or rendering them useless. It embraces, 1st, the field telegraph directions and the field and mountain telegraph sections, which have for their work to complete rapidly the telegraphic communications within the sphere of the operating army, to place them in working order and then to break them up again; 2nd, the reserve telegraph sections, which have to establish in a semi-permanent manner the telegraphic communications that will be required for long periods, so as to extend the permanent telegraph system and connect it with the field telegraph lines. Each telegraph section is divided into a construction and train detachment; the former, which is employed in laying and working the line, is furnished by the railway and telegraph regiment; the train detachments from the train formations. Each army command has a field telegraph Direction of the 1st line; each army communication has a Direction of the 2nd line.

The head of the telegraph service with his staff superintends the whole of the system; he is attached to the headquarters of the Commander-in-Chief, and is subordinate to the Chief of the Staff of the army command in regard to the working detachment.

Landsturm.—In accordance with the Landsturm Law of 1886, noticed last

year, the Landwehr battalion commands were made to act also as Landsturm district commands, both in Austria and Hungary. With a view to giving effect to this by providing for the keeping of the Landsturm rolls, and the charge of the harness, equipment, and arms laid down in the newly established magazines, 1 upper Lieutenant, 1 staff sergeant-major, 1 subdivision leader, and 1 corporal have been attached to each Landwehr battalion command. In Hungary 2 Honvéds and 1 assistant armourer are attached to each Landsturm district, and 1 corporal and 1 Hussar to the headquarters of each of the 10 Honvéd Hussar regiments.

The completion of the army in the field by replacing casualties is to be provided for in the following manner. In the first place the trained men of the Ersatz reserve are to be taken. Next in order come the two first yearly classes of the first levy of the Landsturm, that is, the soldiers dismissed from the colours, men of 33 and 34 years of age, and Landwehr men. The untrained Ersatz reserve, and those who have received temporary releases on account of family circumstances, come in the third rank. There are also those put back from the last year's contingent; those who are only 19 years of age; and, last of all, the three last yearly classes of the first levy of the Landsturm.

The Hungarian contribution towards the defence of the monarchy in Landsturm is the following:—

1st levy—		
92 battalions of 26 Officers 947 men	=	89,516
92 Ersatz companies of 4 Officers 228 men	=	21,344
20 squadrons landsturm hussars of 6 Officers 160 men		
20 Ersatz half squadrons of 3 „ 84 „	=	4,310
(3,700 horses)		
Total 1st levy		115,170

2nd levy—

92 battalions infantry.
20 squadrons hussars.
20 Ersatz half squadrons.

Austria proper has in each of the 82 Landwehr districts, as well as in Hungary, two Landsturm battalions, one of the 1st and one of the 2nd levy. Tyrol finally has its own Landsturm law.

Russia.

Non-commissioned Officer Instructional Battalions.—The frequent discussion of the non-commissioned officer question by the daily press, as well as in the military literature of the day, proves that the want of old experienced non-commissioned officers is seriously felt in Russia. The grounds for this want are partly the insufficient pay, and partly that the future civil life of the non-commissioned officer is not sufficiently looked after; a special recommendation is certainly given for their employment in the Government military and civil departments; but there is no security that a man will obtain such employment. The result of this is that they do not continue to serve beyond the normal period required by law. In the investigation of this question the attention of the responsible officials has for some time past been directed to the constitution of the non-commissioned officers' schools in Germany. As a result of these studies the ordinance of 1887 respecting the institution of instructional battalions for non-commissioned officers was promulgated.

These battalions have for their object to train men to be non-commissioned officers in the infantry. They are to be formed, as required, in the military districts, and placed directly under the chief of the district staff. Each battalion is composed of a permanent and a changing portion; it is divided into 4 companies and a detachment of non-combatants. The commander of the battalion is chosen by the Minister of War, and his appointment approved by the Emperor. He chooses himself, from the Officers of his acquaintance, suitable men to command the companies, and these Officers have the immediate superintendence of and responsibility for the entire duties connected with the companies entrusted to their charge. Subaltern officers to command subdivisions are equally chosen by the company commanders from amongst those having at least four years' service, and who have been specially recommended for their smartness by their immediate superiors.

The permanent portion of the men are chosen with great care from the troops, and the commander of the battalion has permission to apply for any particularly smart non-commissioned officer of whom he may hear, to be transferred to his battalion. The changing portion comprises the candidates for appointment as non-commissioned officer. These are: 1st, men from the ranks, desirous of joining the school; the conditions are: educational qualifications up to the standard of the national schools, very good character, capacity for the duties of a non-commissioned officer, good health and physique, and service in the ranks of at least eight months, including a camp of exercise; 2nd, young men entering the instructional battalions direct; the conditions for these are educational qualification as above, age between 18 and 23 years. Candidates have to apply to the battalion commander for admission on the 1st August in each year.

The battalions are quartered in barracks, and the arrangement for the internal duties is settled according to local circumstances, and promulgated by an order of the General commanding. The whole period of training in the battalion is fixed at two years. The course of instruction begins annually on the 1st September, and, including the examination of the candidates, it lasts until the 15th May following. The instruction embraces the following subjects:—

1st, according to a special programme, religion, reading, style of writing, arithmetic, outlines of Russian history and geography, sketching, plan drawing, and singing.

2nd, according to the programme for these instructional formations, knowledge of duties, sanitation, regulations, gymnastics, fencing and bayonet exercises, swimming, shooting, instruction in general duties.

The training is carried out by subdivisions. The general plan and the nature of the examinations are fixed by the Minister of War. In the second half of May the battalion moves into a camp of its own, in which the training is continued and instruction given in sketching and plan drawing. On the conclusion of the training in camp, the battalion is closely inspected in all branches of duty by a special Board. During the autumn manœuvres the battalion joins the nearest camp.

In return for the benefit derived from the instruction received while with the battalion, every candidate is obliged to serve four years longer than the ordinary period of army service. Those promoted to be non-commissioned officers can be kept on for a further period on the expiration of this time. Those men who, while serving in an instructional battalion, misconduct themselves, or show themselves to be incompetent or lazy, are dismissed from it by the commander, and the time passed by them in the battalion is not allowed to reckon as a portion of their ordinary term of service.

Of those candidates who complete the course, the best are appointed lance-corporals, the rest leave the battalion as privates. Those who come from the

ranks return to their former corps; those enlisted direct are distributed by order of the Chief of the district staff. Each receives a certificate showing his conduct and qualifications, in which it is distinctly stated whether he is considered fitted to be a non-commissioned officer or not. Those who are dismissed as lance-corporal can be promoted to be non-commissioned officers on the nomination of their immediate commanding Officer; the others are obliged to serve at least a year after they are dismissed from the instructional battalion.

Agreeably to the ordinance one battalion was formed last year at Riga, and may be regarded as an experiment, which if successful will be followed by other similar formations.

Organization of the Army: Infantry.—A material increase in the strength of the Army of the Caucasus is contemplated by means of local native formations. The orders issued last year for carrying this into effect lay down a programme for the raising during the three years ending 1890 of 4 rifle battalions and the cadres of 4 reserve battalions. Of these 2 rifle and 2 reserve battalions are to be raised during the present year. In connection with these new formations various purely local corps now in existence are to be abolished.

The rifle battalions have an establishment of 810 combatants in peace, and 970 in war. The reserve battalions have 1,010 combatants in peace, in 5 companies; in war they are expanded into 5 battalions, of which the first four form a regiment of 3,800 combatants, the fifth remains independent, and has 960 combatants.

When the measures contemplated have been completed, there will in peace be an increase over the previous strength in the Caucasus of about 3,800 combatants, and in war of 21,500. The new formations are to have one-third of their Officers and of the non-commissioned officers of each company natives, and the rest Russians.

Turkey.

The reorganization of the armed forces at the disposal of the Sultan was carried a step further during 1887 by the publication of a new Redif (Landwehr) law. This formation, which had previously been based on the Prussian model in two categories or levies—Moggadem and Taali—is now to form only a single one, comprising eight yearly classes. In connection with this change, a redistribution has been made of the Redif battalion districts, which were formerly much too large for the purposes of rapid mobilization. Each of the old districts has now been divided into two, having regard to the number of inhabitants. In consequence of this, each of the old Redif regiment districts now forms a Redif brigade district, and each of the former Redif brigade districts a Redif division district, of which there will now be four to each army corps district. The Redif law provides further for the Muassaff (Nizam) regiments to receive their recruits from the Redif brigade districts bearing the same number. The special arms are recruited from the whole army corps (Ordu) district.

An ordinance unconnected with the Redif law provides for the formation in war time of special bodies of the men still available, after the three categories, Muassaff, Redif, and Mustafiz, have been called out. This residue has been named the Ylavé, and it is hoped to form from it in each of the populous districts of the first four army corps two divisions, thus giving an increase to the army altogether of 8 divisions.

The Recruiting Law of 1886.—The new arrangements for the recruiting of the army ushered in by this law, and which began to take effect from March, 1887, are the result of a Commission formed of von der Goltz Pasha, a German Officer, with Muzafer and Veli Riza Pashas. The consequence is that, while framed in a modern and highly practical spirit, they are nevertheless

in thorough accord with national feeling. The following are some of the more important provisions regarding the organization and division of the country for recruiting purposes.

There are six army district directions. Each of these districts furnishes four army corps, viz. :—

1st Nizam army corps.
2nd Redif „ „
3rd Mustafiz „ „

Each army corps has 4 divisions of 2 brigades of 2 regiments of 4 battalions of 4 companies. A permanent recruiting office is established in each brigade centre, and a recruiting section in every battalion district.

The chief advantages gained by the new law are :—

1st. Every Mahommedan capable of bearing arms receives some military training.

2nd. Every one liable to service is disposed of in the first year of his becoming so, instead of remaining as previously until completing his 26th year.

3rd. The recruiting districts are made identical with the civil administration.

4th. Independent stores of arms, ammunition, and clothing are kept in each battalion district, which will materially facilitate a future mobilization.

5th. The drilling of the Mounsiz—or 2nd portion of the contingent, who are not called up to serve with the colours—every Friday after Mosque in the vicinity of their homes.

The yearly contingent under the new law is distributed as follows :—

First portion—
45,000 men (1st training class) Mouinli.
15,000 to 20,000 men (2nd „ „) „

Second portion—
25,000 to 30,000 men, Mounsiz.

or a total of about 90,000 men.

The first portion serves from 3 to 4 years and 5 to 9 months respectively ; the second portion for 5 months or 1 day weekly.

The reorganization Commission is still sitting ; regulations for the reserve, the Redif, and the Redif depôts drawn up by them, have already received sanction, while those for the formation of a corps of reserve Officers, for the 2nd class of the 1st portion, for the 2nd portion, the Redif cavalry, and for military requisitions have been completed. Regulations for mobilization are in course of being framed, and when these are finished, the work of the Commission will come to a close.

Strength and Distribution of the Army.—At the end of 1887 the force in Europe was distributed as follows :—

1st army corps, Constantinople, 15,000 men, 2,500 horses, 150 guns.
2nd „ „ Adrianople .... 17,000 „ 3,000 „ 170 „
3rd „ „ Macedonia, Epirus, and Albania.

Besides the 3rd army corps there is a detachment from the 1st and nearly a half of the 5th (Damascus), together 32,000 men, 350 horses, 320 guns.

Of these forces one division was stationed at each of the following places : Salonichi, Ueskub, and Kossowo—one division between Skutari, Ipek, and Diakowa. One division garrisoned Monastir and its neighbourhood ; and the two divisions of Janina and Servidje were distributed along the Greek frontier.

The total peace strength of the Turkish army is about 180,000 men, 1,800 horses, and 1,100 field-guns, of which about 700 are horsed.

Armament and Defences.—A magazine-rifle on the Mauser system has been adopted, and contracts entered into for the manufacture of 500,000 rifles and 100 millions of cartridges—the rifles to be supplied at the rate of 500 per day, and the cartridges at 60,000 every three days, the whole consignment to be delivered within three years.

Of the guns ordered from Krupp in 1885, there were delivered last year—

1 coast defence gun of 35·5 cm.
10 „ „ guns of 24 cm.
3 mortars of 21 cm.

and about 100 field-guns, together with various kinds of ammunition. The heavy guns were sent to the Dardanelles; the field-guns were distributed between the newly formed second artillery regiments of the 2nd, 3rd, 4th, and 5th army corps. These are now complete with the exception of a few batteries that have not yet the normal number of guns and wagons. Ammunition wagons are also wanting for the reserve formations, and the artillery arsenal has been hard at work making good the deficiency.

As regards the defences, considerable progress was made during the year 1887. The whole of the fortifications in the Bosphorus were placed in a proper condition for defence. In the Dardanelles special attention was given to the forts "Hamidie," "Namazie," "Nagara," and "Sertil," which now appear to have been completed up to their complete armament. The artillery instructor of the German mission made many tours of inspection to the Dardanelles, and most of the new works have been executed after his designs. The engineer section made a detailed report to the Seraskeriat at the beginning of the year on the capabilities for defence of the Tschataldja lines, and put forward certain proposals which were sanctioned by Imperial Iradé; but further details are wanting. There is, however, no question of constructing new works at any point, but only of remedying the principal evils of the former dispositions made by Generals Blum Pasha in 1877 and Baker Pasha in 1879.

The threatening attitude of Russia has led to the fortresses in Turkish Armenia being placed in a state of defence. The works round Erzeroum were undertaken with energy, and completed in the main in a few weeks. At the close of the year also the works connected with the intrenched camp of Adrianople were completed. The defences of this include the six partly closed and partly open works of "Dort Kaza," "Kokaz," "Top Yali," "Yildiz jeni," "Kara Agadsch," and the work on the railway begun in 1887. All these are field earthworks, and masonry enters only in a small degree into their construction. Each work is to mount 16 guns and hold a garrison of 400 men. From the lines now completed, it is apparent that the north-east side is the most strongly held, and that to the south of the railway station and the bridge over the Arda is the weakest point, being only protected by a single four-sided redoubt each. At the end of the year also the fortification of "Kirk Kilissa" (50 km. on the right flank of Adrianople) was completed.

Infantry Tactics.

Whereas in the review of 1886, the circumstance of chief importance was the general introduction, in the immediate future, of the magazine-rifle, in the past year, special attention was given to the tactical changes consequent upon this circumstance. Changes in arms usually produce modifications in tactics; but as a rule in the tactical formations only and not in the principles of the combat, as regards attack and defence. The defence indeed may derive the greatest advantages from the increased rapidity of fire and the greater

accuracy of the improved arm. In face of this, the attack must develop increased energy, avoiding the application of antiquated tactics more than ever; it must be more thoroughly prepared and more skilfully executed. But this does not warrant the conclusion that the conditions have been changed in favour of the defence. An action consists still, as it has done in the past, in the employment of both one and the other; only the actual circumstances can decide which form will—looking to time and place—have the advantage. It follows from this that the principal arm, as the deciding element, must be equally adapted and trained for both forms. The exclusive adherence to one of them is one of the most frequently observable facts in military history. Whoever has carefully followed the changes in Tactics during the last thirty years, will remember that the Italian campaign of 1859 had for its result the revival of the Suwarrof bayonet and clubbed musket tactics; to press forward regardless of everything, and despising the effect of the enemy's fire, was often praised as the secret of success. After the events of 1866 had made an end of the unlimited faith in the bayonet, it was believed, especially in France, from national vanity, that the Prussian victories were attributable to the breech-loader alone; official French works did not hesitate, after the introduction of an arm superior to the needle-gun, to expressly point to the defence as the strongest form, which did not, however, after the conclusion of the Franco-German war, prevent it being designated as "acting unfavourably upon the *morale* of the troops" (French Drill-book, 1875). The French "Instruction pour le combat" issued last year again declares, giving increased effect to this consideration, that "the attack alone ensures decisive results." To place this in a proper light, it is sufficient to recall the fact that some of the most glorious actions of the German army (Noisseville, Champigny, Beaune, Valérien, the Lisaine, &c.) were brilliant examples of a successful *active defence;* complete victory with a decisive result repaid the German endurance in the last-named defensive battle, which lasted three days.

There can, therefore, be no question of giving a preponderance in principle to one form over the other; and one-sided statements in books of regulations cannot alter the fact. Though we wish to see the defence—the *active defence* be it understood—retain its place in the future, this does not preclude "the innate inclination of the infantry for the attack" as the Prussian regulations express it, "being still more preserved and encouraged." A body of troops that understands how to attack will also defend itself well; the reverse is not always the case. In this sense, and in consideration of the fact that in the majority of cases successful attack will produce the greater tactical results, the attack may still be regarded as the stronger form.

Another, and a highly misleading tactical phenomenon of the present day is the belief in the "normal formation for attack," in connection with the scheme for the attack. An example of this is to be found in the French instructions already quoted. The underlying idea is to secure closer connection, and, by means of this, increased energy in the execution of the attack. The question is whether the contemplated end is to be achieved by the prescribed means, and the reply must be in the negative. Leading principles, the application of which is left to the commander who, in the words of the German infantry drill-book, "has under different circumstances and situations to act in accordance with the actual conditions," do not suffice for the "system." It wishes the freedom of decision, the special advantage of the attack, to be bound to fixed formations, and the movements in execution of the attack to be systematically laid down, step by step. The "system" may certainly be in a position to represent an appropriate picture on the parade ground; in the dissolving waves of battle it soon becomes a caricature of itself. It is suitable alone to a situation that has been foreseen, and not to

one constantly changing under the stress of varied ground, the movements of the enemy, heavy losses, and other unavoidable difficulties; in such a case the situation can only be finally mastered by the energetic and skilful action of all the leaders of every grade. The "system" may now and again have accident to thank for a success, if indeed it should secure one at all, which cannot be guaranteed by the troops being accustomed to it; further, the commander in the attack who binds himself down to prescribed formations abandons one of the most powerful means of superiority—surprise!

In the matter of new regulations, the German infantry received in 1887[1] three most important ones: a new "Musketry Regulation," "Alterations for the revise of Rifle Exercises of 1876," and new "Regulations for Field Service,"[2] previously issued in provisional form in 1886. The chief interest in the first named of these regulations lies in the special instructions regarding the employment of magazine-fire. It increases the effect produced in decisive moments, and may be used as well in open as in close order; under some circumstances, also, magazine volleys may be employed. As a rule magazine-fire is to be used only with the sight down or with the small flap up, and will be applicable to the following conditions: for the final preparation of the attack before the charge; in the defence of a position against an enemy storming it; when attacked by cavalry (as a rule commencing at 300 m.), and in every situation in which a sudden and immediate contact with the enemy supervenes, as in engagements about entrenchments, wood, and villages, &c.; lastly, in firing upon a retreating enemy. In exceptional cases magazine-fire may also be used at distances between 300 and 800 m., when the object is to concentrate the fire upon an exceptionally conspicuous target for a limited period. The battalion commanders and superior Officers indicate generally the objects to be aimed at, and arrange for more ammunition to be brought up. The company commander points out the object to the subdivisions; sees to the range; orders, as a rule, firing to be commenced; controls the fire, and looks to the completion and distribution of ammunition. The subdivision leaders, assisted by the leaders of groups, look to the placing of the subdivision in the position; indicate the range, and order the commencement and nature of the fire; watch the result; look to the expenditure of ammunition, and keep the movements of the enemy constantly in view.

In conclusion, the instructions regarding fire-discipline prescribe that the men are to be trained to act independently in situations in which it becomes impracticable for control to be exercised over the fire. Generally speaking, under such circumstances it is to be understood that within 400 m. any object may be fired at; between 400 and 800 m. only those offering a high and broad target; as a rule objects will not be fired at beyond 800 m.

The regulation changes rendered necessary by the introduction of the new arm are contained in the "Changes in the revise of the Rifle Exercises of 1876." These are for the most part also included in the Musketry Regulations, or referred to in them, and are rendered necessary by the employment of the magazine-rifle both as a repeater and as a single-firing arm. The term "rapid fire" hitherto employed is replaced by that of "magazine-fire" or "magazine volley." Special importance is attributed to the strict disciplining and training of the soldier in changing rapidly from the ordinary

[1] Since von Löbell's Reports were completed, another most important revised book of Regulations, the "Infantry Drill Book," has been published, dated the 1st September, 1888, and it is now in the hands of the troops. ("Exerzir-Reglement für die Infanterie." Berlin, 1888. Ernest Siegfried Mittler und Sohn.)

[2] For a summary of these last Regulations see "Occasional Papers" in Nos. 142 and 144 of the Journal.

single fire to magazine-fire and *vice versâ*. "The rifle as a repeater offers to the soldier a constant and continuous readiness to fire, which is preserved by means of its careful and judicious application and by a continual and timely filling up of the magazine. *The soldier must bear in mind that his arm increases the necessity for a thorough fire-discipline, and that the repeating arrangement is intended to heighten the actual effect of the fire, and not only to increase its rapidity.*"

The trials with an improved pack, referred to in the Reports for 1886, have resulted in the adoption of an "Improved Infantry Equipment," the tactical importance of which is evident. Relief of the shoulders, freer movement of the arms, a better arrangement in lying down, easier use of the intrenching tool, which is more quickly got at; more rapid readiness in case of sudden alarm; greater marching capacity, which is of the highest value, for victory still lies "in the soldier's legs." Last of all, by the introduction of a third pouch, the amount of ammunition to be carried in the pouches has been increased to 100 rounds.

The French infantry received in 1887 a new "Instruction pour le Combat," already referred to, the leading principles of which were, increased importance of the offensive; heightened fire effect by the narrowing of the front of attack; greater energy in carrying through an action by the closer order of the supports and reserves, &c.

In the first phase of the advance, the several tactical units have gradually to get their respective intervals, and gain ground to the front, avoiding losses as much as possible. In the second place, after fire has been opened, regard for losses is to be made subservient to the necessity for the several units to carry out the task set before them; the distances are gradually diminished. Fire is to be commenced as late as possible, but then by a thick firing line which is to be pushed steadily forward towards the enemy's position by means of small advances of the subdivisions and reserves in close order. The troops told off for preparing the decisive action are to be distinctly separated from those destined to carry out the assault; the latter come up into the firing line only during its rapid fire and carry it forward with them to the assault.

The soldier is to be accustomed during his recruit's drill to a determined advance, and the powerful use of the bayonet; the charge is practised physically with a gradually increasing pace. In the firing line all regard to cover is to be abandoned; and the soldier is not to lie down in the open without orders; no firing is to take place unless the order is given, and then only the specified number of rounds are to be fired (series of 3 rounds, volleys by 3 or 4 files), against single individuals lying down or under cover up to 200 m.; standing or kneeling lines of skirmishers from 500 to 600 m.; companies in open order 600 to 800 m.; larger bodies in close order 800 to 1,000 m. The breadth of front of a company of 200 rank and file, with others on its flanks, is not to exceed 105 m.; the deployment is from line of peloton columns (the two pelotons in column of subdivisions, with subdivision distance between them). During the advance of the leading subdivisions up to 600 m. from the enemy they are gradually extended first into half subdivisions, then into groups, and, lastly, into files. The formation of the firing line is then proceeded with if it is found impossible to advance further without firing; the subdivisions forming the supports conform to the movement after gaining an interval of 200 m. by stepping short. On nearing the firing line, at about 100 m. from it, a third subdivision extends and reinforces it; the fourth, still in close order, takes up a position behind the more exposed flank.

The further advance from 600 m. is carried out by rushes of from 80 to 100 m. in length; the Captain himself leads the firing line, a short halt for firing takes place after the first rush, when the fourth subdivision extends

and prolongs the threatened flank. Another rush carries the company to 400 m. from the enemy's position and every rifle is then brought into play. The further rushes, only 50 m. in length, are carried out under the pressure from behind of the companies of the second line, up to 200 m. from the enemy. Bayonets are then fixed, and rapid fire, without using the magazine, is opened. If this does not force the enemy to evacuate his position, a last rush is made and then magazine-fire is commenced, followed by the order "En avant—pas de charge—marche!" The charge is sounded, the Officers and non-commissioned officers place themselves at the head of their commands, and the pace is increased to the pas de course. The whole throw themselves on the enemy with the cry "En avant à la baïonnette!" A company acting alone must always retain a subdivision intact for the assault, which will be carried out under the personal command of the Captain.

In the attack of a battalion a new preparatory formation has been adopted (colonne pour le combat) which is an open double column with subdivision or peloton intervals between the two half battalions and distances of two pelotons between companies. This formation is applicable to meeting cavalry attack, the two leading companies closing in and the rear ones forming outwards on their flanks, similar to the Prussian company square. Mobility and easy conversion to the marching formation is expected from it, and the front and depth of the formation may be increased to 232 and 300 m. respectively.

The following alterations are to be noticed in the attack formation of a battalion. The breadth of front has been diminished from 350 to 210 m. with a depth at first of 500 m. At 600 m. from the enemy the formation for attack takes place, the regard for cover is dropped, and the troops in rear of the firing line gradually close up first to a total depth of 300 and subsequently to 100 m. During the advance over the interval between 1,500 and 600 m., the division of the companies in the manner specified above is carried out as rapidly as possible and without interrupting the forward movement; from 600 m. the advance is by rushes, by alternate companies, from 200 m. at the double and then the charge. The peculiarity in the execution of this attack is the uninterrupted advance of small pelotons in close order, which joining the firing line, in exactly prescribed succession, push forward the right and left wings of the firing line by rushes. At a distance of 200 m. all four companies are in the firing line, those of the first line (1 and 3) extended, those of the second (2 and 4) with their deployed pelotons in close order immediately behind. The battalion now stands in a close mass, with three rifles to the metre, opposite the enemy. If the latter be evidently shaken, the assault follows upon the quick fire; otherwise fresh troops must be employed for the assault, and the battalion forming the regimental reserve will be led forward by the commander of the regiment, either in deployed line or as is prescribed for the battalion acting alone. The regimental colour is carried in front of the centre of the battalion, the Officers lead their respective commands.

The last portion of the new Instruction prescribes that the troops shall be practised in impromptu and accidental actions where neither of the opposing bodies is in the occupation of a position, so as to give them increased pliability and mobility; the advantages of the initiative should not be left to the enemy. Regiments, brigades or divisions should form three lines under ordinary circumstances; the first begins the attack and carries it out up to 200 m. from the enemy; the second supports the movement and carries out the assault; the third occupies the captured position and undertakes the pursuit. When the first line meets with unforeseen and serious opposition, and is unable to carry out the task ordinarily allotted to it, the second line must join it, and the third will then be employed for the assault.

It is a matter for surprise how this closely compressed "normal attack"

is to be effected by an uninterrupted movement in a space of from 20 to 30 minutes (from entering the zone of action 1,600 m.) with its systematically arranged action of each subdivision, its narrow front, crowded firing line, sufficient fire preparation, and disregard for cover in the face of the magazine-fire of well-trained infantry.

The introduction of[1] magazine-fire has led to some changes in the musketry regulations. Practice with the magazine is to take place with the fixed sight, 10 rounds being fired standing or kneeling, at first in 50 seconds and subsequently in 40. A practice in magazine subdivision volleys at 1,000 m. has been introduced into squad firing ; and magazine-firing at the disappearing and subdivision targets at 200 to 300 m. Magazine-firing will ordinarily be reserved for decisive moments ; its employment being ordered by the Captain or exceptionally by the subdivison leader. It is laid down as a principle that magazine-fire is more advantageously employed when on the defensive, for the attack must seek a decision rather through a determined advance than by means of fire, and the use of the single-loader will suffice to cover this advance. The too early employment of magazine-fire seems to weaken the self-confidence of the troops. Magazine-volleys should only be delivered when there is some movement in the air, for in still weather the object will be obscured after two or three volleys. The best distance for magazine-fire is from 150 to 250 m. ; all the portions of a line should not employ magazine-fire at the same time, in order that a well-sustained fire may be maintained to the last.

Russia still hesitates to adopt a magazine-rifle, and it appears the authorities considered the rapidity of fire of the Berdan rifle to be sufficient for all practical purposes. General Dragomiroff was of opinion that the only advantage of a repeating rifle is the rapid emptying of the magazine, which is only measured by seconds. Whereas the disadvantages are diminished accuracy (?), greater weight of the rifle, less simplicity in mechanism, increased danger of wasting ammunition. Another authority, Kuropatkin, only agrees to the introduction of a magazine-rifle on the condition that the fire is continuous without taking the rifle from the shoulder, and that a smokeless powder is used with it, neither of which conditions can be secured as yet.

The rearmament of the Austro-Hungarian infantry with the small-bore Männlicher magazine-rifle has been pressed forward. One of the principal advantages of this excellent arm is that the magazine can be filled by separate packets of cartridges as rapidly as a single cartridge can be inserted in an ordinary rifle. In critical moments this is an invaluable qualification. The Instructions for the use of the new rifle lay down, that though it can be used as a single-loader, its employment as such is against the principle of the arm. The danger involved in the extraordinary rapidity in loading is not overlooked ; but it is hoped to meet this by a stricter enforcement of fire-discipline.

In Italy, after extensive trials, the infantry has been armed with the Vitali magazine-rifle. As a rule magazine-fire is not to be used at greater distances than 300 m., but this is liable to modification in practice. It is to be employed during the preparation for assault, against bayonet attacks or charges of cavalry, and in firing upon an enemy falling back after his attack has been repulsed.

The review on infantry tactics during the past year concludes with a valuable summary of the most notable new publications on the subject and

[1] It is stated that by the 1st November, 1888, the rearmament of the active portion of the French army with the new repeating small-bore (Lebel) rifle will be completed, and that the Territorial army will also be provided with it by 1st April, 1889.—H. H.

references to the more important articles that have appeared in military periodicals.

The chapters on Cavalry, Field Artillery, and Fortress Warfare Tactics are not behind that on Infantry Tactics in interest, but space does not admit of more than a passing reference to them. In the first-named of these, attention is called to the fact that the principles of the tactical employment of cavalry in the present day are the same in all armies. The necessity for strategical and tactical observation by means of cavalry divisions and divisional cavalry is generally acknowledged. In cavalry circles in every country the conviction has gained ground that even in future, in spite of modern arms, the cavalry will be called upon to assist at the decision on the battle-field by the action of individual squadrons and regiments, as well as of large masses. In regard to the tactical and strategical pursuit so often neglected hitherto, it has been accepted as indispensable if decisive results are to be gained. In war, as it is now carried on, cavalry cannot neglect fighting on foot on occasion ; but this is still generally regarded as only an expedient to be adopted under necessity. A general agreement has further been arrived at on the Continent in regard to mounted infantry, which, as an organization for European warfare, does not find favour ; and even Russia has modified the views previously held in regard to it. The advantages to be gained from its employment out of Europe, in colonial wars, &c., are, on the other hand, generally acknowledged.

The chapter on Field Artillery Tactics is chiefly occupied with a long reference to the second edition of Prince Hohenlohe's letters on field artillery, published last year, and of the highest value. It contains also a short notice of the new French regulations, "Instruction sur l'Emploi de l'Artillerie dans le Combat," in which are adopted these two principles, viz., that the artillery, the same as any other arm, is to receive its orders from the commander of the troops, and that in the artillery duel, its whole strength must be employed, and therefore that no reserve should be kept as a separate body.

Fortress Tactics are treated of in three parts, the two first of which are of the greater interest. The first contains a discussion upon the defensive systems of France and Germany as compared with each other. The second is occupied with the progress made by the several European States in their works of defence and war material. The third part contains the discussion of various questions connected with fortress warfare which have been ventilated in the military periodicals.

THE TRANSPORT OF THE RUSSIAN FIELD ARMY FROM THE PORTS OF THE SEA OF MARMORA AND THE GULF OF BURGAS TO THE SOUTH RUSSIAN PORTS IN 1878 AND 1879.

(Translated from the Russian Naval Magazine of 1884 by Captain J. Wolfe Murray, R.A., D.A.A.G.)

[The operation described in this paper having taken place in part more than ten years ago, and the account of the operation having appeared in the Russian Naval Magazine by no means recently, some apology is rendered necessary for the present translation. This apology must be sought for in recent discussions as to the quantity of tonnage requisite for the transport of troops by sea; and it is thought that the Russian experience—even though it be not recent—may throw some additional light upon what must be for us, as a naval and insular Power, a question of the greatest moment.]

On the 2nd August, 1878, orders were issued to commence the transport of the troops of the field army from Turkey in Europe back to Russia. The Guard and line army corps which were detailed to be thus transported were cantoned along the shores of the Sea of Marmora from San Stefano to Gallipoli.

The transport of an army of 200,000 men, with its cavalry, artillery, trains, parks, and hospitals, is a very serious and difficult affair, and in this case was especially so, as the embarkation had to take place in the open ports of the Sea of Marmora, in which the southerly winds, which prevail at this time of year, are apt to raise a heavy swell which seriously impedes the lading of steamers. Two conditions had to be observed in carrying out the operation: first, the work had to be finished as rapidly as possible, as the whole army was most anxious to return home; and secondly, it had to be done in the cheapest possible manner.

The Ports, Piers, and Embarkation.

As the order for the evacuation of Turkish territory had been anticipated for some time, the preliminary work had been taken in hand since the beginning of June; such, for example, as the hiring of vessels, selection of ports for embarkation, and the construction of piers. Four ports in the Sea of Marmora were selected, viz., San Stefano, Biyuk Chekmeje, Erekli, and Rodosto; and in the Black Sea, Burgas and Chingil Iskilesi (the southern bight in the Bay of Burgas) were chosen. There were small jetties at some of the ports only, at which vessels of light draught could lie alongside; and so the existing piers had to be extended and run out to a depth of 8 to 10 feet, and in addition at each port several new jetties had to be constructed, and metalled approaches had to be made to all the jetties. These works were entrusted to the engineers and sappers of the field army.

San Stefano.—(*a*) The town pier was planked over afresh; (*b*) the commissariat pier was lengthened from 148 to 270 feet; (*c*) a new pier, 281 feet long, was built for embarking horses and vehicles; (*d*) a pier was made, 83½ feet long, for embarking men; (*e*) a special pier with half a T-head was made which served as a sort of sheltered port for the steam-launches and large Turkish caïques.

Biyuk Chekmeje.—(*a*) The town pier was placed in thorough repair; (*b*) a pier for embarking horses and vehicles, 291 feet long, was built; (*c*) a pier for similar purposes, on the other side of the bay, was made, 195 feet long; (*d*) a pier, 130 feet long, for embarking men, was constructed.

Erekli.—Three piers, each 65 feet long, were built for embarking men, horses, and vehicles.

Rodosto.—(*a*) A new pier, 257 feet long, was made for embarking horses and vehicles; (*b*) a second pier for similar purposes, 224 feet long, was built; (*c*) the town pier lengthened and widened. The pier was widened to 14 feet, and at the head of the pier its width was increased to 30 feet for a length of 30 feet.

All the piers were provided with cast-iron bollards and with ringbolts to which steamers could be moored.

The piers were run out to a depth of 10 feet of water at San Stefano, Biyuk Chekmeje, and Erekli, and at Rodosto to a depth of 6 feet. All the piers were provided with metalled approaches.

Burgas.—A new pile jetty, 160 feet long, for embarking men, horses, and vehicles, was run out to a depth of 9 feet.

Chingil Iskilesi.—(*a*) A trestle pier for the embarkation of men, length 85 feet, was run out to a depth of 7 feet; (*b*) a trestle pier for embarking horses and vehicles, length 105 feet, was run out to a depth of 9 feet. The head of the pier was on piles.

In spite of the rapidity with which these piers were built, they were very substantial, and they thoroughly satisfied the requirements for which they were made, especially those in the Sea of Marmora.

The number of piers to be constructed at the various ports corresponded with the numbers of troops which were to be embarked at those particular ports. All the ports of embarkation were connected by lines of field telegraph.

Means of Lading.

The steamers hired for the transport of troops, with the exception of six flat-bottomed steam lighters, belonging to the Russian Company, drew from 12 to 24 feet of water, and consequently auxiliary vessels had to be employed to load these ships. For this purpose the naval Commander-in-Chief in the Black Sea sent the tug "Rodimy," the lighter "Korshun," 10 steam-launches, and 5 large and 3 small barges.

Three steam lighters were hired from the Russian Steam Navigation Company, and three tugs were hired in Constantinople. In addition to these the military authorities purchased at Constantinople 1 tug, 2 steam-launches, and 46 large Turkish caïques.

According to the calculations as to the work which would probably have to be done, 5 steam lighters and 5 large barges were required in addition; but it was found impossible to hire these, as at the season at which the movement took place such vessels are in great request on the rivers falling into the Black Sea, for the grain trade.

As the large Turkish caïques were comparatively of little use in embarking horses, guns, and vehicles, a raft was formed of each pair of such caïques. Twelve such rafts were formed, the others being utilized to embark men, forage, and light stores.

Distribution of Means of Lading among the Ports of Embarkation.

At *San Stefano* the steam-lighters "Korshun" and another belonging to the Russian Company, the tug "Rodimy," 3 steam-launches, 2 barges, 4 rafts, and 4 large caïques.

At *Biyuk Chekmeje*, 1 steam-lighter, 1 tug, 2 steam-launches, 3 rafts, and 4 large caïques.

At *Erekli*, 1 steam-lighter, 1 tug, 2 steam-launches, 2 barges, 3 rafts, and 6 large caïques.

At *Rodosto*, 1 steam-lighter (the same vessel as that used at Biyuk Chekmeje; it was sent on from there), 1 tug, 2 steam-launches, 1 barge, 2 rafts, and 4 large caïques.

At *Burgas*, 1 tug, 2 steam-launches, and 6 large caïques.

After the transport of troops was completed from the Sea of Marmora the following vessels were sent to Burgas: the tug "Rodimy," the steam-lighter "Korshun," 6 steam-launches, 5 barges, and 8 large caïques. From Odessa another tug was also sent.

Kiuchuk Chekmeje.—The lake of this name lies 5 miles from San Stefano on the same shore of the Sea of Marmora, and stretches for nearly 7 miles inland, coming close up to the line of railway. A station bearing the same name was built on the shore of the lake. This lake is joined to the sea by a stream 1,200 or 1,300 yards in length, which is tolerably deep, but at the mouth of which there is a bar, the depth on which was from 6 inches to 1 foot only when the wind was from the sea, and the bar was 50 feet in width.

The Commander-in-Chief, in view of the extremely advantageous position of this lake as regards the railway, and also as the whole of the 3rd Division of the Guard was collected about the Kiuchuk Chekmeje station, had ordered the entrance to the lake to be deepened, so as to be able to approach close up to the station by water, and thus to open up the cheapest method of supplying the 3rd Guard Division and all the other troops quartered in this *rayon*. Moreover the despatch of supplies from the stations at Constantinople and San Stefano was much impeded by the heavy traffic and by the want of rolling stock.

The work of deepening the passage proceeded energetically, and in 2½ weeks the channel had been dug out to 3½ feet. During the first days 100 labourers and the same number of soldiers from the Guard regiments were at work. The work could not proceed more rapidly because at the end of April it was still too cold to work in the water. In spite of this, 17 days after work was begun, vessels drawing 3½ feet began to pass through the channel, and even vessels drawing 4 feet could be "portaged" over it. From the middle of May up to the end of August about 100 boats laden with provisions, forage, and other stores for the troops passed daily through the channel.

At this time the evacuation of the sick was in full swing, and 6,800 sick were transported from San Stefano alone to Russia, and in this work the steam-launches were actively engaged. But for this purpose launches were also sent to Biyuk Chekmeje and Erekli. As the work developed four launches, manned by forty men, were found to be insufficient. There was such a deficiency of engineers and stokers that at times it was found impossible to despatch the launches.

In consequence of this it was decided to hire additional engineers and stokers, and also to purchase two more launches; and orders were given to transport four launches from the Danube, so that there were then ten launches at Kiuchuk Chekmeje. This increase necessitated a corresponding augmentation of the personnel, and also made it desirable that workshops for repairs to the launches should be set up. For this purpose the requisite machinery was purchased in Odessa, and temporary workshops were established.

From the commencement of June to the beginning of August the launches were exclusively employed in the evacuation of the sick, and in loading and unloading the "Vesta," "Vladimir," "Constantine," and "Eriklik," vessels belonging to the Navy which ran at stated intervals.

Kiuchuk Chekmeje thus became, as it were, the port of San Stefano—a

port with convenient anchorage for launches and caïques, with barracks for the boats' crews, repairing shops, coal stores, and other requisites for the craft employed in the embarkation.

During the whole of the period of the transport of the troops, Kiuchuk Chekmeje supplied all the ports of embarkation with all the requisite material and executed repairs to the launches. After the troops had completely evacuated the country everything was transported on vessels belonging to the Navy from Kiuchuk Chekmeje to Burgas.

Steamers Freighted for the Transport of the Troops.

The Committee appointed by the Commander-in-Chief to consider the question had under its consideration about ten tenders for the transport of the troops, which were made by various persons and steamship companies; but the tender of the Russian Steam Navigation Company was found most advantageous, and accordingly a contract was entered into with that Company. But as the Company could only supply twenty vessels, and more than forty were required to carry out the evacuation with success, it was agreed that it should hire twenty-two foreign steamers, and convey the troops upon them at the same rates as on their own. This course was considered more advantageous, as the Government would then have to deal with only one Company.

Bunks were fitted up in the holds of the vessels for the troops, and galleys were arranged to supply the men with hot meals, the vessels supplying the necessary utensils. Wooden stalls were fitted up for horses. These fittings became the property of Government on conclusion of the operation, but they were made at the expense of the Company. The troops were rationed by the Company, with the exception of bread and biscuit which the men took on board with them for the voyage.

Forty-eight hours were allowed for the loading of every steamer with troops, horses, vehicles, and baggage, and a similar time for unloading. The vessels were to take in provisions, coal, and water during this period.

The following is a list of the vessels employed, with the number of troops carried by each:—

Russian Steam Navigation Company's Vessels.

Name of vessel.	Tonnage, gross.	Carrying capacity.
Alexander	1,118	800 men
Azoff	1,414	1,500 „
Boug	1,000	800 „
Tsarevitch	2,035	2,000 „
Gounib	1,400	800 „
Korniloff	1,944	2,000 „
Lazareff	1,638	1,800 „
Nakhimoff	1,662	1,800 „
Odessa	1,751	1,700 „
Oleg	1,140	800 „
Rostoff	1,200	1,500 „
Russia	2,269	2,000 „
Tcherkask	1,466	1,500 „
Tchikhatcheff	1,963	2,000 „
Total	22,000	21,000 men

Non-Russian Steamers Chartered for Conveyance of Russian Troops in 1878.

Name of vessel.	Tonnage, gross.	Carrying capacity.
W. H. Atkinson	1,368	2,000 men
Bergen	1,469	1,400 „
Bessarabia	1,644	1,945 „
Crosby	1,498	1,585 „
Fusiyama	969	1,280 „
James Barber	1,443	1,520 „
Kielder Castle	1,010	1,500 „
Knight Templar	1,546	2,240 „
Lutetia	1,169	1,300 „
Matthew Cay	1,354	1,700 „
Morgan Richards	969	1,200 „
Nordcap	1,498	1,600 „
Richard Anning	1,132	1,900 „
Rossend Castle	1,728	2,700 „
Royal Crown	1,844	2,850 „
Sam Weller	1,498	2,840 „
Septima	1,216	1,340 „
Severn	1,271	1,400 „
Success	1,136	1,660 „
Taymouth Castle	1,827	1,900 „
J. B. Walker	1,482	1,700 „
Zoe	1,509	1,820 „
Total	30,580	39,380 men

Towards the end of the transport operation, the "Moskva" (2,965 tons gross), the "Petersburg" (2,897 tons gross), and the "Russia" (3,134 tons gross), belonging to the volunteer fleet, arrived from Cronstadt. These vessels were also hired to transport troops from the Sea of Marmora to Odessa and Sevastopol. The "Moskva" and the "Russia" were fitted for transporting troops, and each accommodated 2,100 men; but the "Petersburg" was also fitted with compartments for horses, but could not take more than 350 horses. As the capacity of these vessels was not determined practically, it was calculated that they would accommodate not less than 2,500 men. But it was found after the first trips, when 2,500 men were put on board, that this number was inconveniently large, and the number was subsequently reduced to 2,100 or 2,200 men.[1]

The vessels belonging to the Russian Company and the foreign steamers were each marked with a large number in white, and the foreign vessels flew the Russian flag at the mast-head. Vessels with sick also hoisted the red-cross flag.

In addition to the above vessels there were also four vessels belonging to the Navy, the "Grand Duke Constantine," the "Vladimir," the "Vesta,"

[1] These vessels had little accommodation in proportion to their size. Much space was taken up by cabins, these vessels having been engaged in the passenger trade in America prior to their purchase by the Volunteer Fleet Association.

and "Eriklik," at the disposal of the Commander-in-Chief. The last named usually conveyed the Commander-in-Chief, and the other three acted as dispatch vessels. The "Taurida," belonging to the Russian Company, was allotted to the Company's agent for his conveyance from port to port.

Administration.

The superintendence of the transport of the troops by railway and sea was entrusted to a Colonel on the General Staff, and the supervision of the embarkation of the troops and the general direction of the naval part of the operation was in the hands of the Flag-Captain of the naval Commander-in-Chief, and all naval Officers charged with the embarkations at the various ports were immediately under his orders.

For the immediate supervision of the embarkation of men, horses, vehicles, and baggage, a superior naval Officer was appointed at each port (as Captain of the port), with other naval Officers under him. Fifty sailors were detailed for each port.

An Officer of the General Staff was appointed to direct the movements of the troops at each of the ports, and he was assisted by field Officers from the troops.

The number of Officers allotted to the various ports was as below :—

San Stefano.—1 Commander, 2 Lieutenants, and a Midshipman; 1 Lieutenant-Colonel on the Staff, and 2 regimental field Officers; an agent of the Russian Company.

Biyuk Chekmeje.—1 Commander, 2 Lieutenants; 1 Captain on the Staff, 2 regimental field Officers; and an agent of the Russian Company.

Erekli.—1 Commander, 1 Lieutenant; 1 Captain on the Staff, and 2 regimental field Officers; an agent of the Russian Company.

Rodosto.—1 Commander, 1 Midshipman; 1 Captain on the Staff, 2 regimental field Officers; an agent of the Russian Company.

At all ports the sailors were distributed among the steam-launches, barges, rafts, and caïques, and the remainder were employed on the piers.

Duties of the Captains of the Ports and of the Staff Officers.

The piers and all the appliances for embarkation, such as tugs, launches, barges, caïques, &c., and the sailors were under the immediate orders of the Captain of the port. He was also entrusted with the superintendence of the steamers during the time they were in port.

The Staff Officers at the ports, in charge of the movements of troops, received information from the Officer in general charge of the movement of the troops, as to the number of troops which would arrive at their particular ports, and the order in which they would arrive. But the Officer in charge of the movement of the troops by sea communicated both to the military Staff Officer at the port, and to the Captains of ports, (*a*) the number of steamers told off for the embarkation of troops at a given port, and (*b*) which vessels were fitted for the transport of men, which for horses, and which for vehicles.

The Captains of the ports and the military Staff Officers drew up in conjunction a list showing the distribution of the troops to be embarked in the various steamers, the piers at which they were to embark, the hours at which they would arrive on the piers, and the time they would require to get embarked. The military Staff Officer was held responsible for obtaining a correct state of the troops to be embarked, and he also had to forward to the proper authorities the distribution list of the troops on the eve of the embarkation.

When the troops came on to the pier, they came under the orders of the

Captain of the port, who was entirely responsible for the embarkation of the men, horses, vehicles, and baggage.

Captains of ports and military Staff Officers were furnished with copies of the contract with the Russian Company, so that they might see that it was properly observed, and that they might conform their dispositions to its provisions. The Captain of the port kept a journal in which were shown the time of arrival, the times of commencement and conclusion of the embarkation, and the time of departure of every steamer. If the time the vessel was in port was in excess of that laid down in the contract an explanation of the cause of such delay was given. The journal was verified by the signatures of the Captain of the port and by the Russian Company's agent.

The departure of each steamer was telegraphed to the Russian ports, to the Officer in general charge of the movements of the troops, and to the Officer in charge of the naval transport operations. Similarly the disembarking Officer at the Russian port wired to the Officer in general charge of the whole movement the time at which the disembarkation was completed, and the time at which each vessel left for the Turkish ports.

All orders relating to the transport of the troops were given to the Staff Officers at the ports by the Officer in general charge of the whole movement, but the Captains of the ports received their orders from the Officer in charge of the naval movements.

No Commanding Officer had any right to interfere with the disposition of the Captain of the port or of the military Staff Officer, or to give them any orders, or alter their dispositions. On the contrary, all Officers in authority with the troops were bound to render them every assistance.

Instructions were issued to all Commanding Officers as to the maintenance of order during embarkation and when on board ship.

Embarkation of the Troops from the Ports of the Sea of Marmora.

Early in August, 1878, all the necessary appliances for the embarkation were ready at the ports, and on the 11th August the embarkation of the troops began.

The following shows the distribution of the various units at the different ports :—

From San Stefano for Sevastopol.

Headquarters 1st Guard Division
- Headquarters 1st Brigade — 2 Guard infantry regiments.
- Headquarters 2nd Brigade — 2 " " "

1st Artillery Guard brigade.
6th Don Cossack battery of the Guard.
1st Guard infantry Divisional mobile hospital.
1 Divisional ammunition column.

For Nikolaiev.

Headquarters 2nd Guard Cavalry Division
- Headquarters 1st Brigade — Guard Lancer regiment.
- Headquarters 2nd Brigade — Guard Dragoon regiment. Guard Hussar regiment.

2nd and 5th Guard horse artillery batteries.
Guard rifle brigade.
13th temporary hospital.

For Odessa.

Headquarters Guard Corps { Volhynian Guard infantry regiment.
Petersburg „ „ „
(2 battalions without train).
Guard gendarme squadron.
Guard sapper battalion.
74th temporary hospital.

From Biyuk Chekmeje for Sevastopol.

The Ural Cossack squadron.
2 squadrons of the 7th Cossack infantry battalion.

For Nikolaiev.

Headquarters 2nd Guard Infantry Division. { Headquarters 1st Brigade } 2 Guard infantry regiments.
{ Headquarters 2nd Brigade } 2 „ „ „
Headquarters and 6 batteries 2nd Guard artillery brigade.
Horse grenadiers of the Guard.
2nd Guard infantry Divisional field hospital.
1st rifle ammunition park section.
7th cavalry park section.
57th temporary hospital.

For Odessa.

Headquarters 3rd Guard Infantry Division. { Headquarters 2nd Brigade } 2 battalions Petersburg Guard regiment (with train of the whole regiment).
{ Headquarters 1st Brigade } Lithuanian Guard infantry regiment.
3 batteries 3rd Guard artillery brigade.
3rd Guard infantry field hospital.
Headquarters and the whole of the 9th infantry Division (VIIIth Corps), with its artillery, field hospital, and ammunition column.
3rd and 4th rifle brigades.
2 rifle ammunition park sections.

From Erekli for Sevastopol.

3rd Grenadier infantry Division.
3rd „ artillery brigade.
3rd „ field hospital.
11th Divisional flying ammunition park.

For Nikolaiev.

14th infantry Division.
14th artillery brigade.
14th Divisional field hospital.
15th flying ammunition park.
4th sapper battalion.
52nd and 69th temporary hospitals.

For Odessa.

Keksholm regiment of the 3rd Guard infantry Division.
Headquarters and 3 batteries of 3rd Guard artillery brigade.
14th Divisional ammunition column.
2nd cavalry park section.

From Rodosto for Sevastopol.

The Emperor's regiment of Cossacks.

For Nikolaiev.

Headquarters of the Grenadier corps.
2nd Grenadier infantry Division.
2nd „ artillery brigade.
2nd „ field hospital.
18th Divisional ammunition column.

For Odessa.

Headquarters 3rd Brigade } Emperor's Lancer regiment.
2nd Guard Cavalry Division } Grodno Hussar regiment.
3rd battery Guard horse artillery.
26th infantry Division.
26th artillery brigade.
26th Divisional field hospital.
7th Divisional ammunition column.
53rd and 67th temporary hospitals.

The troops proceeded to the three ports of Sevastopol, Nikolaiev, and Odessa, where the disembarkation was superintended by Naval Officers. The vessels left the ports of embarkation independently and not in convoys; and as each vessel was of different capacity, it was impossible to adhere to the administrative units in placing the troops on board, it was frequently necessary to send on one steamer either a portion of a unit or an agglomeration of several bodies. The same was the case with the baggage of the troops. But in such cases, if the vessels were not dispatched together, they were sent off in sequence.

Each unit on arriving at the port of embarkation handed over to the Military Staff Officer a correct state showing the number of Officers, men, horses, and vehicles, showing, with regard to the latter, the number of S.A.A. carts, ammunition wagons, and guns, and whether the latter were 9-prs. or 4-prs.

The Captain of the port in conjunction with the military Staff Officer distributed the troops to the various steamers; one man being told off to each horse, and a certain number of men to each vehicle.

On the arrival of a steamer in port, the Captain of the port inspected her, and informed the master of the hour at which the troops would embark, of the number of men, horses, and vehicles which were told off to his ship. The military Staff Officer informed the troops of the hour at which they should arrive at the pier.

The troops, on arrival at the pier, were drawn up close to but clear of the pier. In the artillery and cavalry, the horses, which had previously had their shoes taken off, were unsaddled or unharnessed, and the requisite number of men were told off to each gun or vehicle. The Officers commanding artillery and trains took preparatory measures for taking the guns and vehicles to pieces, and the stores were so placed that they could be taken off without loss of time.

The troops were marched on the pier only on the orders of the Captain of the port, and then in military order ; and they also took their places in the barges, rafts, or caïques by his orders, the Officers each being present with their respective units. The most absolute silence and order was observed during the embarkation.

The Officer in charge of the troops embarking went on board first, and in conjunction with the master of the vessel arranged for the distribution of the troops in the holds and to the bunks. The Officer in charge was also responsible for the maintenance of order during the passage of the troops from the shore to the vessel, and during the shipment of horses and vehicles from the barges, rafts, and caïques on board the vessel ; and he had to see that they were accommodated according to his previous allotment of the space.

When the vessel was loaded, the Captain of the port and the military Staff Officer boarded the vessel, and in company with the Officer commanding the troops on board verified the number on board, and gave a certificate to that effect to the master, as required by the contract.

From three to five steamers were loaded simultaneously, and as the terms of the contract only allowed forty-eight hours for the lading of each steamer —demurrage being paid for any delay beyond that time—work had to proceed by day and night. And it not unfrequently happened that the work of embarkation only ceased at 3 A.M., and recommenced at 5 A.M. At Biyuk Chekmeje the embarkation lasted for twenty-nine days, and according to the journal there were 488 hours occupied, which gives an average of seventeen working hours per day.

The steamers belonging to the Russian Steam Navigation Company were well supplied with means for embarkation, the greater portion of the vessels had two or three steam-winches each, and the hatchways and companions were large and commodious. The masters and their assistants by their experience and energy contributed greatly to the success of the embarkation. But the foreign vessels were far less well provided in this respect, and their hatchways were small, and the companions were very inconvenient. Generally speaking, they were not nearly so well suited to the transport of troops as the vessels of the Russian Company. The masters and their assistants, with few exceptions, took no part in the embarkation and loading of their vessels, and all the superintendence of the work fell to the lot of the agent of the Russian Company, and thus the assistants to the Captains of the port were obliged to be continually on board the steamers to look after the embarkation.

The agents of the Company had also to provide for the victualling of Officers and men during their stay on board the vessels.

The embarkation of the troops commenced simultaneously at all the ports of the Sea of Marmora on the 11th August, and was finished at San Stefano on the 9th, at Biyuk Chekmeje on the 10th, at Rodosto on the 15th, and at Erekli on the 16th September.

The capacity of each vessel had been previously determined, and a list had been made out showing what men, horses, and vehicles each could take. But as the transport of the troops took place at the hot season of the year, 10 per cent. less men and horses were put on board than the normal, in order to avoid overcrowding.

The Officers were distributed on the vessels of the Russian Company according to the number of 1st and 2nd class cabins ; but to the foreign vessels, as there was less cabin accommodation, a small number of Officers was generally allotted ; even then some of the Officers had to sleep on the poop under the awning.

The Officers in command of troops on board received blank forms containing certain questions to which they had to give replies on arriving at the

port of disembarkation. These mainly referred to the health, feeding, and order maintained among the troops on board. The Officer commanding had likewise to give the master of the vessel a ration certificate showing the number of men carried and the period for which they were rationed.

Officers and orderly N.C.O.'s were regularly detailed by roster for the maintenance of discipline on board. In case of accident or of storm, all the men were obliged to remain in their places, and the Officers to take post with their men, the Officer commanding taking up his position alongside the master.

There were despatched from the Sea of Marmora 2,937 Officers, 109,721 rank and file, 16,218 horses, and 5,605 vehicles.

During the transport of the troops there were no casualties among the men, but seventy-five horses on the steamers "Korniloff" and "Lazareff" were lost. Both these vessels loaded with horses at Rodosto, and on entering the Black Sea met with a fresh easterly wind with a heavy sea. Owing to the heavy rolling, some of the horses belonging to the Emperor's lancer regiment of the Guard, which were very fat in condition, died, and others broke away from their picketing ropes and were killed. As all the lancers were then suffering greatly from sea-sickness, and as none of the fourteen sailors who formed the entire crew could be spared from their duties, it was impossible to render these animals any assistance. The master of the "Korniloff" hauled up to windward, and made for Sevastopol instead of Odessa, which was his destination, so as to diminish the rolling. After this occurrence a diminished ration of oats was given to the horses for several days before embarkation. The author of the article recommends that besides this precaution, at least two additional sailors per hold should be told off to each vessel conveying horses.

On the conclusion of the transport of the troops from the Sea of Marmora the piers at the ports were handed over to the municipal authorities free of charge; all the craft employed in the embarkation of troops were towed to Burgas, except some caïques which would not stand the journey. The military telegraph gear was also taken down and sent to Constantinople.

Embarkation and Transport of Troops at Burgas.

On the 15th September the transport of the troops from Burgas and Chingil Iskilesi (the southern bight of the Gulf of Burgas) to Russia commenced.

At Chingil Iskilesi there were 1 Commander and 1 Lieutenant, and at Burgas 1 Commander, 1 military Staff Officer, and 2 field Officers from the troops for the purpose of supervising the embarkation of the force.

At Burgas there had been constructed by the Engineer Department in the month of May a large pile pier close to the small pier belonging to the town. At Chingil Iskilesi the construction of two small trestle piers was completed on the 15th September.

The following craft were employed for embarking purposes:—Two tugs belonging to the Navy, and a steam-lighter also belonging to the Navy, 6 steam-launches (the remainder, which had been brought round from the Sea of Marmora, required considerable repairs, and were accordingly sent on to Odessa), 3 large and 3 small barges, and 12 large caïques.

For the transport of the troops the following vessels were chartered:—

Belonging to the Russian Company—

Name of vessel.	Tons gross.
"Russia"	2,269
"Cesarevitch"	2,035

	Name of vessel.	Tons gross.
	"Nakhimoff"	1,662
	"Odessa"	1,751
	"Tchikhatcheff"	1,963
	"Rostoff"	1,200
	"Azoff"	1,414
	"Tcherkask"	1,466
	"Gounib"	1,400
	"Boug"	1,000
Volunteer fleet—		
	"Russia"	3,134
	"Moskva"	2,965
	"Petersburg"	2,897
Foreign steamship—		
	"Nordcap"	1,498

At the outset the embarkation took place simultaneously from the piers at Burgas and Chingil Iskilesi, but early in October a Board of Officers pronounced the Burgas pier to be unsafe, as all the piles were found to be worm-eaten. Orders were accordingly given to take the pier down and to build a new one. After this the embarkation of troops and stores was confined to Chingil Iskilesi. This bight is completely sheltered, and consequently, even when the wind was blowing freshly, it was possible to load the barges, &c., at the pier, and to transship from the barges to the steamers, while the roadstead at Burgas is open from the N.E. to S.W., and with a fresh breeze and swell from seaward, it is not only impossible to load barges at the pier, but vessels lying in the roads are obliged to go to Chingil Iskilesi, where there is convenient anchorage.

From Burgas to Chingil Iskilesi there are eight miles of very bad road, and on the way the River Mandra has to be crossed either by means of a ferry or by two fords. The inconvenient nature of this road considerably delayed the movement of the troops, and was an especial impediment to the artillery parks and trains; and accordingly, at the commencement of October, orders were given to improve the road by throwing a floating bridge over the River Mandra in place of the ferry, and two pile bridges at the fords, by metalling the road, and by making proper approaches to the piers.

The troops were transported to Sevastopol, Odessa, and Nikolaiev, and some Cossack regiments were taken to Taganrog. The following troops were transported :—

24th artillery brigade.
24th Divisional field hospital.
10th ammunition flying park.
36th and 39th Don Cossack regiments.
2nd section of 2nd mobile park.
12th Don Cossack battery.
24th and 38th Don Cossack regiments.
Terek irregular regiment.
2nd section of 3rd mobile park.
5th ammunition flying park.
3rd infantry Division.
3rd artillery brigade.
81st temporary hospital.

The transport of the troops was considerably delayed owing to the non-arrival of the troops at the times named; their detention was due to a change

in the political situation. Some steamers had to lie in the roads for more than ten days, and this caused an expenditure of about 5,600*l.* for demurrage.

The transport of the troops was concluded on the 7th November, without any casualties. There were despatched from Burgas and Chingil Iskilesi 794 Officers, 20,687 rank and file (including 2,044 sick), 5,697 horses, and 2,081 guns and vehicles. The total force transported from the Sea of Marmora, Burgas, and Chingil Iskilesi was 3,731 Officers, 134,408 rank and file, 21,915 horses, and 7,736 guns and vehicles.

Of the foregoing there were transported on the—

	Officers.	Rank and file.	Horses.	Guns and vehicles.
Russian Company's vessels	2,270	78,310	14,252	4,326
Foreign steamers	941	41,672	6,941	3,063
Volunteer fleet	520	14,336	722	347
Total	3,731	134,318	21,915	7,736

The total number of voyages was—

Russian Company's vessels.....	127
Foreign steamers	68
Volunteer fleet vessels	10
Total	205

The total cost of the transport was 208,373 roubles (20,837*l.*), of which 58,643 roubles (5,864*l.*) was for demurrage.

It is impossible to determine accurately the actual cost of the transport of the troops, horses, and vehicles, as a very considerable quantity of heavy baggage was despatched with the troops, the weight of which could not be determined. It is only possible to make this calculation approximately, without taking the heavy baggage into account, by taking as a guide the space allotted in accordance with paras. 49, 50, and 53 of the regulations for the transport of troops by water.

By these regulations each man is allowed 21 inches in width and 7 feet in length, each horse 3 feet 6 inches in width and 7 feet in length, and for a vehicle about 86 square feet. Taking this as a basis, and making a man the unit, we find that a horse occupies in width and height the same space as four men, and a vehicle the same as eight men, since the men are packed in two tiers in the holds and cockpits where the height of these is not less than 7 feet.[1]

The cost then, without demurrage, was approximately—

	Roubles.	£	*s.*	*d.*
Per man[2]	5½	= 0	11	0
„ horse	22	= 2	4	0
„ vehicle	44	= 4	8	0

The demurrage increased the cost by 3·75 per cent.

[1] Owing to the quantity of baggage being undetermined, it is also impossible in this case to give any very definite results as to the tonnage necessary for each man, horse, and vehicle; but it may be pointed out that, if we reckon 5 tons per Officer, 1 ton per man, 4 tons per horse, and 8 tons per gun or vehicle, we shall absorb the total aggregate of the tonnage employed on all the trips, with the exception of, roughly, 22,000 tons, which we may perhaps assume to have been required for the heavy baggage.—TRANS.

[2] In making this calculation it is reckoned that each of the 483 Officers who were not given cabin accommodation occupied the space of three privates, and every sick man transported took up the same place as two healthy men.

The comparative cost of the Russian Company's, the foreign vessels, and those of the volunteer fleet, is also entered into by the author, but it will suffice here to say that the volunteer fleet steamers were the most expensive, as they had very small accommodation in proportion to their size. Much space was taken up by cabins, because these vessels prior to their being purchased by the volunteer fleet had been engaged in the passenger trade to America.

At the end of October a contract was concluded with the volunteer fleet for the transport of the annual contingent, for the troops in the territory still in Russian occupation, from Odessa to Burgas and Varna. The vessels engaged in this service were the "Russia," "Petersburg," and "Moskva," belonging the volunteer fleet; the "Cesarevitch" of the Russian Company; and the "Ekaterina" of the Petersburg Steam Company.

The transport of reinforcements for the troops of the army of occupation commenced from Odessa on the 12th October, and the last échelon arrived at Burgas on the 18th October. The total number transported were—

Officers	91
Rank and file	21,948
Horses	2,577

The return steamers brought back the time-expired men and a small quantity of warlike stores.

Second Embarkation of Troops at Burgas.

The second embarkation of troops in the Bay of Burgas commenced on the 16th February, 1879. By this day the following work had been completed by the engineers:—At Burgas a new pile pier had been built; the road to the piers in Chingil Iskilesi Bay had been made; a floating bridge and two smaller bridges had been thrown over the Mandra River. In Chingil Iskilesi Bay a third pier had been constructed between the other two, and all three were connected by a bridge on piles, so that they took the form of the letter "m," and formed two basins into which the small craft could enter through gaps specially made in the bridge. This pier was extremely convenient, and its length was sufficient to allow eight barges to lie alongside it simultaneously. Opposite the pier two wooden houses were built, each of five rooms, one for the staffs of the corps, divisions, brigades, and regiments, and the other for the Officers superintending the embarkation. At about $1\frac{1}{2}$ mile from the piers, huts had been put up for the Officers and men to be transported to Russia; and on shore, close to the piers, huts had been run up for the labourers; and at $\frac{3}{4}$ mile from the piers mud barracks had been built for the two battalions quartered at Chingil Iskilesi to supply working parties. There were also coal and forage stores at the piers. In fact, the shore at Chingil Iskilesi, which during former embarkations was quite a desert, now presented quite a lively aspect. There were then only two piers and two small tents, and the troops were often exposed to the rain and had to lie in the mud for twenty-four hours, whereas now they were accommodated in huts immediately on arrival.

A Commander and another naval Officer were told off to Chingil Iskilesi, and two naval Officers were detailed for Burgas. These Officers and also all the other naval Officers and crews engaged in the work were placed under the orders of a Post Captain of the Navy. All these Officers were immediately under the orders of a General Officer who was in charge of all the transport arrangements.

In addition to the craft available at the port of Burgas, two tugs were hired in Constantinople, and five additional barges were taken up. They were distributed as follows:—At Burgas, 2 tugs, 4 large and 2 small barges,

5 steam-launches, and 6 large caïques ; at Chingil Iskilesi, 2 tugs, 4 large and 1 small barges, 3 launches, and 2 caïques. One tug kept up communication between Burgas and Chingil Iskilesi, making three trips a day.

The following vessels were chartered for the conveyance of the troops :—The "Russia," "Tchikhatcheff," "Cesarevitch," "Korniloff," "Lazareff," "Nakhimoff," "Odessa," "Rostoff," "Azoff," "Tcherkask," "Gounib," "Boug, belonging to the Russian Company, and the foreign steamers "Travancore" (1,748 tons gross), "Angelina" (1,180 tons gross), and "North Shields' (1,209 tons gross), and the "Russia" and "Moskva" belonging to the volunteer fleet.

The "Petersburg" of the volunteer fleet, and the "Ekaterina" (1,253 tons gross), belonging to the Petersburg Company, were chartered specially for the transport of the sick.

The following were the troops to be transported :—

At *Burgas*.—13th Army Corps with its artillery, all headquarters, hospitals, and train ; 1st infantry division with its headquarters, divisional hospital and train, 1st artillery brigade, 3 ammunition parks, and sick.

At *Chingil Iskilesi*.—14th Army Corps, with headquarters, and hospitals ; 17th and 18th artillery brigades with their headquarters ; 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 9th, 10th, and 12th reserve battalions ; 2nd Kuban Cossack regiment, 34th Don Cossack regiment, 8th Don Cossack battery, 14th section of cavalry ammunition flying park, 22nd ammunition flying park, 2nd section of 4th ammunition flying park, 9th section of cavalry ammunition flying park, 1st section of 6th mobile park, 13th section of cavalry ammunition flying park, 26th cavalry ammunition flying park, 5th and 6th sapper battalions, 2nd engineer field park, 4th and 6th telegraph parks, Nos. 48, 50, 51, 52, 53, 56, 66, 68, and 71 temporary hospitals ; and various detachments.

At 8 A.M., on a fine, spring-like morning on the 16th February, the Borodino regiment and the 1st and 2nd reserve battalions, and a company of the 5th sapper battalion were drawn up on the pier at Chingil Iskilesi, previous to embarking on the "Moskva." At 9.15 A.M. the battalion embarked on the barges lying at the pier, and at 11.10 A.M. the "Moskva," having taken on board 59 Officers and 2,100 rank and file, weighed anchor ; the embarkation thus lasted 1 hour and 55 minutes.

On the next day the embarkation at Burgas commenced. The embarkations thenceforward proceeded simultaneously there and at Chingil Iskilesi ; when a heavy swell interfered with the loading of the barges at Burgas, the troops detailed for embarkation at Burgas were sent round to Chingil Iskilesi.

The following is a list of the troops embarked at Burgas and Chingil Iskilesi in February and March, 1879.

	Steamers.	Officers.	Rank and file.	Horses.	Guns.	Ammunition wagons.	Vehicles.
Burgas.	Russian Company	459	18,817	1,885	88	685	968
	Volunteer fleet	268	9,773	..	..	..	2
	Foreign vessels	79	7,184	1,366	..	..	2
	Total	806	35,774	3,251	88	685	972
Chingil Iskilesi.	Russian Company	646	22,648	4,806	78	571	1,349
	Volunteer fleet	307	1,234	..	..	..	17
	Foreign vessels	30	1,173	..	27	282	386
	Total	983	36,165	4,806	105	853	1,752
	Grand total	1,789	71,939	8,057	193	1,538	2,724

During this period the following sick were conveyed:—

On the "Ekaterina"	— Officers,	2,098	rank and file.
„ "Petersburg"	38 „	3,159	„ „
Total	38 „	5,257	„ „

Grand total force transported, 1,827 officers, 77,196 men.

In one journey, all the vessels employed, transported 320 officers, 15,440 men, 1,747 horses, and 916 guns, ammunition wagons, and vehicles.[1] The Russian Company's vessels made 61 trips, the volunteer fleet 11, and the foreign vessels, 12; total, 84 trips.

The average cost of transport was—

	Rs.	ks.	£	s.	d.
Per man (without victuals)	4	27	= 0	8	6½
Per horse	16	70	= 1	13	5
Per vehicle	33	50	= 3	7	0
Per ton of baggage	19	22	= 1	18	5

The average cost of victualling a man for the whole trip was 41 kop. = 10*d*.

The cost of transport was on this occasion considerably less than in the former instance, although the terms of the contract were almost identical in both instances, for the following reasons:—

(1.) The time of the year was more favourable, as it allowed men and horses to be packed more closely, without fear of overcrowding.

(2.) The foreign vessels made four trips each, and consequently, payments for demurrage were spread over a larger number of voyages than on the previous occasion, when they were spread over only three voyages.

(3.) The loading of the steamers was better carried out because (*a*) the

[1] This is at the rate of rather less than 5 tons per Officer, 1 ton per man, 4 tons per horse, and 8 tons per vehicle.—TRANS.

steamers which conveyed vehicles and baggage were specially fitted for the purpose; (*b*) all persons employed in connection with the embarkation had had a certain amount of experience. And in this matter, experience has shown that practice has considerable importance even for the masters of vessels.

During this embarkation, there were no accidents with men or horses; and in spite of the fact that some units arrived late at the piers, in consequence of the bad state of the roads, from the heavy rain, no demurrage had to be paid to any vessel for being detained beyond the stipulated time.

The transport of the troops was concluded on the 20th March, and all the small craft were sent back to Odessa. The operation had lasted 33 days, and there were transported from Burgas, 1,827 officers, 77,896 men, 8,057 horses, 193 guns, 1,539 ammunition wagons, 2,724 vehicles, and 2,742 tons of military stores.

The rapid embarkation of troops is of importance, not only strategically, but also from an economical point of view. At the time that this operation took place, the provisioning of the army of occupation in Turkey was costing the Government twice what it would have done in Russia, and forage for the horses was three and four times the ordinary price in Russia: so that every extra day spent in Turkey was costing the Government a considerable sum. Moreover, the more rapidly the troops, &c., could be embarked, the less would the vessels be detained, and consequently, a smaller number of them would need to be chartered. This would diminish the cost per voyage, as a lower freight would be asked for, if the detention in port were shortened, and also the extra expenditure for fitting up the vessels would be less, owing to the smaller number of them.

The success of the embarkation and of loading the vessels depends not only on the skill and experience of the officers in charge, but also upon the craft (lighters, &c.) employed. In the ports of the Sea of Marmora, and at the first embarkation at Burgas, the small steam-lighters of the Russian Company were employed, and they were found to be far less convenient and advantageous than the large, shallow-draught barges. Consequently, at the second embarkation at Burgas, barges were employed. The holds of the steam-lighters can only be usefully employed for transporting men and baggage from the shore to the vessel; horses, guns, ammunition wagons, and vehicles had to be placed on the decks, and consequently the barges are more commodious than the small steam-lighters, the decks of which are encumbered with hatchways, steam-cranes, &c., which occupy space which might be more usefully employed. On the deck of a barge 130 to 150 feet long, 30 feet wide, there were placed 110 to 130 horses, 80 guns and ammunition wagons, 60 vehicles, and 700 to 800 men on the deck and in the hold; while on a small steam-lighter, not more than 80 horses, 50 guns, 40 vehicles, and 600 men were placed. In addition, the barges are more easy to load, their sides can be let down, which is an advantage for running guns and vehicles on board, and horses will more readily walk up the ramps so formed, and are not frightened by the hissing of the steam as on board the small steamers. Generally speaking, the barges were loaded nearly twice as quick as the small steamers. There is also a great saving in the cost, the barges and tugs costing about $\frac{1}{7}$th of what would be paid for their equivalent in small steam vessels.

The writer of the article was employed first at Biyuk Chekmeje, and afterwards at Chingil Iskilesi; and during eight months assisted at the embarkation of 159 steamers, which conveyed 2,679 officers, 109,706 men, 16,426 horses, 6,265 guns and vehicles, and he gives it as the result of his experience that no amount of theoretical knowledge, but only practice, can attain thoroughly good results. Before starting to join the active Army, he endeavoured to read up the subject, but the material published in Russian

was quite inadequate. This he remarks is the more surprising, as in every war between Russia and Turkey, the former Power has had to transport troops by sea, sometimes by whole Divisions at the war strength. He, therefore, thinks the results of his experience may be of some use for the future.

NOTICES OF BOOKS.

Prince Eugene of Savoy. By Colonel G. B. MALLESON, C.S.I. London: Chapman and Hall, 1888. Pp. 264. Size 8¼″ × 5½″ × 1″. Weight under 1¼ lb. Price 6*s.*

"No criticism," says the author, "can be more false than that which has been made by island prejudice, to the effect that Eugene owes his fame to having been associated with Marlborough. A perusal of this book will dispel that error . . . Eugene, in fact, owed nothing to Marlborough." Colonel Malleson has given us, in his usual pleasant style, an interesting account of the hero whom he considers should have a pedestal to himself among military commanders.

With the Camel Corps up the Nile. By Count GLEICHEN, Lieutenant, Grenadier Guards. London: Chapman and Hall, 1888. Pp. 320. Size 8½″ × 6″ × 1½″. Weight under 1 lb. 14 oz. Price 9*s.*

Count Gleichen modestly states, in his preface, that this book is not anything more than what its title proclaims it to be, a record of what the Camel Corps, and more especially the Guards Camel Regiment, saw and did up the Nile in 1884–85. He has not attempted to describe things he did not see, and he has purposely avoided "cribbing" from other people's books on the same subject. He expresses his wish that any inaccuracies in the work should be pointed out to him, for his aim has been to present not a fanciful, but a true picture of what occurred. What greater recommendations for perusal can any book of this kind, especially when well written and well illustrated, possess? This is just the sort of literature which gives light to those who are uninitiated in irregular warfare; and at the same time affords plenty of valuable information to be turned hereafter to practical use by those who may find themselves engaged in expeditions of a similar character. If others who in the Egyptian Campaigns were in subordinate positions, similar to that held by Count Gleichen, will follow his example on the same lines of telling us what they saw and not what they heard, we shall gradually learn a good deal about those wars worth knowing.—L. A. H.

Reynell Taylor, C.B., C.S.I. A Biography. By E. GAMBIER PARRY. London: Kegan Paul. Pp. 357. Size 9″ × 6″ × 1½′. Weight under 2¼ lbs. Price 14*s.*

Mr. Parry has done well what has been to him a labour of love, and has given us a very interesting and well-written biography of one of our most upright and ablest Indian soldier-statesmen.

Vassili Verestchagin: Painter, Soldier, Traveller. Autobiographical Sketches. Translated from the German by F. H. PETERS. 2 vols. London: Richard Bentley, 1887. Pp. 666. Size 8″ × 6″ × 2½″. Weight under 3 lbs. Price 24*s.*

A collection of interesting reminiscences of places and people. Those of the Russo-Turkish War are as well worth reading as any in the volumes.

The Sailor's Pocket Book. By Captain F. G. D. BEDFORD, R.N., C.B. Fifth Edition. Revised and Enlarged. Portsmouth: Griffin and Co. 1888. London: Simpkin, Marshall. Pp. 560. Size 5¾″ × 5″ × 1¼. Weight under 1¼ lb. Price 7*s.* 6*d.*

This valuable publication is well known and appreciated. We are glad to see the Fifth Edition called for so soon after its immediate predecessor.

Eighteen Hundred Miles on a Burmese Tat through Burmah, Siam, and the Eastern Shan States. By Lieutenant G. J. YOUNGHUSBAND, Queen's Own Corps of Guides. London: Allen, 1888. Pp. 162. Size 7½ × 5¼ × 1″. Weight under 1 lb. Price 5*s.*

The book is what, in the preface, it professes to be, merely a record of new countries and new nations as seen with the eyes of an ordinary British subaltern, and doubtless it is, as the author claims, a faithful record. All books of this kind are of value as contributions to the knowledge of the provinces adjoining India: and we can only suggest that, in the next effort of the kind, the author should strive after what he in his preface expressly professes to discard, literary merit in the description and arrangement of his observations.

Infantry Fire Tactics. By Captain C. B. MAYNE, R.E. Second Edition. Chatham: Gale and Polden. Pp. 526. Size 7¼″ × 5¼ × 1¼. Price 6*s.* Post free to all parts of the world.

Although Captain Mayne has temporarily, and only temporarily we trust, transferred his scene of professional work to the Canadian Dominion, he keeps touch with the Old World and at the same time picks up information in the New. The result is to be found in this newly issued edition of this valuable work, the merits of which have already been brought before the members of the Institution in previous notices, and which, brought up to date, enlarged and revised, ought, as we have before said, to be in the hands of every soldier.—L. A. H.

How to Obtain a School of Musketry Certificate. Pp. 262. Size 5″ × 4″ × ¾″. Price 3*s.* 6*d.*

Guide to Promotion to Field Rank in the Auxiliary and Reserve Forces. By Captain A. DAVID DOUGLAS, 5th Batt. Royal Fusiliers. Pp. 182. Size 3¼″ × 4″ × ½″. Price 2*s.* 6*d.*

Catch Questions in Infantry Drill. By Lieutenant G. D'ARCY-EVANS, 1st Batt. R. F. Rifles. Pamp. Pp. 32. Price 6*d.* each, or 5*s.* per dozen.

Field Fortification. Notes on the Text-Books. By Major H. D. HUTCHINSON, B.S.C. Pp. 147. Size 7½″ × 5″ × ½″. Price 4*s.*

These works are published by Gale and Polden of Chatham, as parts of their Military Series. The prices are post free.

Extract from the By-laws.

Section II.—Composition.

1. Princes of the Blood Royal; Lords Lieutenant of Counties; Governors of Colonies and Dependencies; Officers of the Army, Navy, Marines, Her Majesty's East Indian Military and Naval Forces, Militia, Yeomanry, Royal Naval Reserve, and Volunteer Corps shall be entitled to become Members, *without ballot*, on payment of the Entrance Fee and Annual Subscription.

N.B. Any Officer coming within the above definition, who may wish to become a Member of the Institution, can do so by copying one of the subjoined Forms, and inclosing it to the Secretary:—

Form for Becoming an Annual Subscriber.

_____ 18

It is my desire to become a Member of the Royal United Service Institution; and I hereby request and authorise my Agents [or Bankers], Messrs. _____, to pay my Entrance Fee (£1) and Annual Subscription (£1) now, and as it becomes due on the 1st of January in each year, to the Secretary of the Institution.

_____ Signature.

_____ Qualification for Membership.

Form for Becoming a Life Subscriber.

It is my desire to become a Life Member of the Royal United Service Institution; and I hereby authorise my Agents [or Bankers], Messrs. _____ to pay my Entrance Fee (£1) and Life Subscription (£9) to the Secretary of the Institution.

_____ Signature.

_____ Qualification for Membership.

2. Ex-Governors of Colonies and Dependencies, Retired Officers, Deputy Lieutenants of Counties, Civil Functionaries who are or have been attached to the Naval and Military Departments, the Master, Deputy Master, and Elder Brethren of the Trinity House, and Army and Navy Agents, shall be *eligible* to become Members by *Ballot*.

3. Gentlemen above the age of *fifteen*, whose names are on the list of the Commander-in-Chief for Commissions in the Army, or who are probationary for offices connected with the Naval and Military Professions, shall be *admissible*, by *Ballot*, become Provisional Members from year to year, on payment of the Annual Subscription; and after they obtain their appointments, they may become ordinary Members on payment of the Entrance Fee.

N.B. Members admissible by Ballot must be proposed and seconded by two Members of the Institution, and their names will be submitted to the Council for election. Ballot papers may be obtained at the Institution.

Form of Bequest.

I give and bequeath unto The Royal United Service Institution, *situated in Whitehall Yard, London, the sum of*

to be applied in and towards carrying on the designs of the said Institution, such Legacy to be paid out of such part of any personal Estate not specifically bequeathed as the law permits to be appropriated by Will to Charitable Purposes.

No. 145 CONTAINS:—

PAGE

The Equipment and Transport of Modern Armies. By Colonel H. M. HOZIER, Lieut.-Colonel 3rd Kent Artillery Volunteers 681

The Physique of the Soldier and his Physical Training. By Colonel G. M. OSSLOW, A.A. and Q.M.G., Inspector of Gymnasia, Aldershot 705

Military Cycling. By Lieut.-Colonel A. K. SAVILE, late Professor of Tactics, Military Administration, and Law, R.M. Coll., Sandhurst 731

Fire Discipline and the Supply of Ammunition in the Field, as provided for by Foreign Powers. By Captain WALTER H. JAMES, F.G.S., late R.E.... 759

Fast Cruizers. By Sir EDWARD J. REED, K.C.B., F.R.S., M.P. 781

OCCASIONAL PAPERS.

Horse Artillery in Foreign Armies. By Captain C. E. CALLWELL, R.A., Staff Captain Intelligence Division 801

Colonel v. Löbell's Annual Reports upon the Changes and Progress in Military Matters during 1887. By Colonel H. HILDYARD, Highland Light Infantry 805

The Transport of the Russian Field Army from the Ports of the Sea of Marmora and the Gulf of Burgas to the South Russian Ports in 1878 and 1879. Translated from the Russian Naval Magazine of 1884. By Captain J. WOLFE MURRAY, R.A. 845

Notices of Books 863

THE COUNCIL of the ROYAL UNITED SERVICE INSTITUTION are desirous of obtaining the assistance of OFFICERS of the NAVAL and MILITARY SERVICES in carrying out the Courses of Lectures at the Institution.

Officers who will favour the Institution with a Lecture, or a Course of Lectures, are requested to communicate with the Secretary.

The Lectures, and the Discussions which follow them (or an Abstract of them), and Descriptions of Inventions, are published in the Journal of the Institution, subject to the discretion of the Council, and illustrated, when necessary, by Diagrams.

By order of the Council,

B. BURGESS, Captain,
Secretary.